# A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS

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**FOR THE AWARD OF DEGREE OF**

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**IN**

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**BY**

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**(MAY,2021)**

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I declare that the thesis entitled "**A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS**" has been prepared by me under the guidance of **Dr. Ravinder Pal Singh**, Professor, Department of General Surgery, Dayanand Medical College and Hospital, Ludhiana. No part of this thesis has formed the basis for the award of any degree previously.

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*Dedicated*

*to*

*my family*

*&*

*Teachers*

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*Dr. Anurag Tomer*

# ABBREVIATIONS

| | |
|---|---|
| HB | HEMOGLOBIN |
| TLC | TOTAL LEUCOCYTE COUNT |
| SIRS | SYSTEMIC INFLAMMATORY RESPONSE SYNDROME |
| MODS | MULTIPLE ORGAN DYSFUNCTION SYNDROME |
| USG | ULTRASONOGRAPHY |
| CT SCAN | COMPUTERIZED TOMOGRAPHY SCAN |
| MRI | MAGNETIC RESONANCE IMAGING |
| AUC | AREA UNDER ROC CURVE |
| PCT | PROCALCITONIN |
| LDH | LACTATE DEHYDROGENASE |
| AST | ASPARTATE AMINOTRANSFERASE |
| BUN | BLOOD UREA NITROGRN |
| SBP | SYSTOLIC BLOOD PRESSURE |
| PaO2 | PARTIAL PRESSURE OF OXYGEN |
| FiO2 | FRACTION OF INSPIRED OXYGEN |
| SD | STANDARD DEVIATION |

# ABSTRACT

**Introduction:** The Bedside Index for Severity in Acute Pancreatitis (BISAP) score consist of following five criteria - Blood urea nitrogen (BUN) levels >25 mg/dL, impaired mental status, presence of SIRS, age > 60 years, and presence of pleural effusion.

**Aim of Study:** To evaluate the BISAP score to predict severity of Acute Pancreatitis.

**Materials & Methods**: This prospective study was conducted on 50 consecutive patients diagnosed as acute pancreatitis admitted in emergency department of DMC&H. BISAP score was calculated based on data obtained within 24 hours of hospitalization. Severity of AP was defined according to the Revised Atlanta Classification, 2012. Organ failure was defined using the Modified Marshall scoring system.

**Results:** The leading cause of acute pancreatitis in our study is gall stones, with maximum 26 (52.0%) cases. Second most common cause is alcohol with 11 (22.0%) cases. SIRS is the most common component of BISAP score, present in 47 (94.0%) cases. Pancreatic necrosis present in 12 (24.0%) cases. Incidence of pancreatic necrosis rises at score ≥ 3 which is statistically significant (p-value- 0.008). Transient organ failure present in 14 (28.0%) cases, persistent organ failures presents in 9 (28.0%) cases and 27 (54.0%) cases have no organ failure. At score ≥ 3, there is increased risk of organ failure and it is statistically significant (p-value – 0.00). There are 27 (54.0%) mild, 14 (28.0%) moderately severe and 9 (18.0%) severe cases of acute pancreatitis. At score ≥ 3, there is increased risk of moderately severe and severe pancreatitis and it is statistically significant (p-value – 0.00).

**Conclusion**: There is statistically significant trend of increasing incidence of organ failure, pancreatic necrosis and moderately severe / severe acute pancreatitis at BISAP score ≥ 3. Thus, BISAP score is simple yet accurate scoring system to improve early risk stratification in acute pancreatitis.



**Keywords:** Acute pancreatitis, BISAP score.

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# INTRODUCTION

Acute pancreatitis is defined as an inflammatory process of the pancreatic parenchyma. It is among the leading cause of acute abdomen. It has variable presentation from mild disease requiring few days of hospital admission to life threatening course with significant morbidity and mortality. Acute pancreatitis requires hospitalization, early evaluation and risk stratification. It presents major surgical challenge[1] to general surgeons worldwide.[2] Mostly acute pancreatitis follows mild course and but few patients may develop a severe disease course. In severe disease, parts of pancreatic tissue and adjoining tissue become necrotic. It can progress from systemic inflammatory response syndrome (SIRS) to multiorgan failure. An early and accurate risk stratification protocol in acute pancreatitis would help in early initiation of appropriate therapy for patients with severe acute pancreatitis to prevent adverse outcomes and thus improving survival rates among patients.

The revised 2012 Atlanta classification is a valuable tool to assess acute pancreatitis. It has improved our understanding about acute pancreatitis, its course and classify pancreatic and peripancreatic fluid collections. It divides AP into 2 phases, early phase which is first 1 or 2 weeks and late phase. It also classifies acute pancreatitis as interstitial edematous pancreatitis or necrotizing pancreatitis. Severity of the AP divided as mild, moderately severe and severe AP.[3]

A model score should allow an early, accurate, quick and reliable risk stratification of the severity of disease. Multiple scores have been defined to evaluate the severity of disease, including Ranson criteria,[4] Glasgow-imrie prognostic criteria, acute physiology and chronic health evaluation (APACHE) II,[5] and computed tomography severity index (CTSI).[6] However, all of them have their pros and cons. The limitation of Ranson criteria is that it needs data that require 48 hours of hospitalization, which may lead to missing an early therapeutic window and increased

mortality.[7] Also, Ranson criteria is accurate at extreme scores (< 3 indicate mild and > 6 predicts severe disease) but not at intermediate scores.[8] APACHE II allows determination of severity of AP at admission but it is complex and needs number of parameters to calculate, some of which are not relevant to prognosis.[9,10] CTSI score is based upon CT findings of local complications and does not reflect the systemic inflammatory response.[11,12]

Wu et al[13] in 2008, proposed bedside index for severity in acute pancreatitis (BISAP) scoring system, a prognostic scoring system for early prediction of morbidity and mortality in acute pancreatitis. Data for BISAP score collected within the first 24 hr of hospitalization.

**BISAP Score**

1. Blood urea nitrogen (BUN) > 25 mg/dl
2. Impaired mental status defined by Glasgow coma scale (GCS) score <15)
3. Systemic inflammatory response syndrome (SIRS)

   If more than 2 of following criteria present

   - Pulse >90 bpm
   - Respiration Rate (RR) >20/min or $PaCO_2$ < 32 mm Hg
   - Temperature >38°C (100.4°F) or <36°C (96.8°F)
   - Total leucocyte count (TLC) > 12000 or < 4000 cells/$mm^3$ or > 10% immature neutrophils

4. Age > 60 yrs
5. Pleural effusion (on chest X ray or ultrasound or CT scan)

Each point on BISAP score is given 1 point.

# AIMS AND OBJECTIVES

Aim and objective of our study is to evaluate Bedside Index for Severity in Acute Pancreatitis (BISAP) scoring system to predict severity of disease among patients of Acute Pancreatitis.

# REVIEW OF LITERATURE

Acute pancreatitis is defined as acute collection in pancrease or peripancreatic region presenting with characteristic abdominal pain, amylase and/or lipase level is at least three times above normal and characteristic findings of acute pancreatitis on ultrasound abdomen and/or computerized tomography (CT) scan and /or magnetic resonance imaging (MRI).

The severity of pancreatitis varies widely from mild disease that needs conservative treatment to severe and complicated disease. An early and reliable clinical scoring method can dramatically improve the management of acute pancreatitis. A risk stratification tool to predict the morbidity and mortality is of great clinical importance.

Wu et al[13], in 2008, proposed BISAP scoring system for prediction of mortality in AP. It was obtained from data collected from 17,992 patients of AP from 212 hospitals in year 2000-2001. Then, BISAP score was further validated on data collected from 18,256 cases of acute pancreatitis from 177 hospitals in year 2004-2005. It's accuracy to predict mortality was calculated by the area under receiver operating characteristic curve (AUC). CART analysis on collected data has identified five variables for prediction of in-hospital mortality. One point was given to each of the five variables of BISAP score.

Papachristou GI et al[14], compared BISAP scoring system with other scoring systems on 185 patients and confirmed that it is an accurate means for risk stratification in patients with AP. Its components are easy to calculate and clinically relevant.

Vikesh K. Singh et al[15], examined BISAP score among 397 patients of acute pancreatitis in year 2005 to 2007. Trend and discrimination analysis was done on data collected on all patients. There were 14 (3.5%) deaths among 397 patients. Their study suggest statistically significant trend for increasing mortality ($p<0.0001$) with increasing BISAP score. The area

under the receiver operating curve for mortality in prospective cohort was 0.82 (95% confidence interval: 0.70, 0.95), which was similar to validation cohort by B U Wu. It concludes that BISAP score equal or more than 3 was associated with an increased risk of developing organ failure, persistent organ failure and pancreatic necrosis.

Hariprasad T. R et al[16], concluded in their study that patients with BISAP score more than 3 and having organ failure have prolonged hospital stay. SIRS was the most common component of BISAP scoring system (91.3%). Elderly patients with age more than 60 years had high BISAP score of 5. A BISAP score of ≥3 was associated with higher morbidity than scores of <3. All patients with shock had BISAP score of >3.

Kim B et al[17], compare BISAP with PCT and conclude that the accuracy of BISAP (≥ 2) at predicting severe acute pancreatitis was 84% and better than serum PCT. The best cutoff value of BISAP was 2 (AUC, 0.873; 95% confidence interval, 0.770 to 0.976; $p < 0.001$). In logistic regression analysis, BISAP had greater statistical significance than serum PCT.

Kaushik MR et al[18], found in their study that BISAP score calculated within 24 hours of admission of 2 or more significantly predicted severity and complication of acute pancreatitis with p-value <0.001. Statistically significant trends of increasing severity and organ failure ($p<0.001$) with increasing BISAP was observed.

Cho YS et al[19], studied BISAP score on 299 patients in their institution and conclude that there was increasing severity and mortality in patients of acute pancreatitis with increasing BISAP score which was statistically significant ($p < 0.001$).

Gompertz et al[20], reviewed the medical records of 128 patients of acute pancreatitis to calculate BISAP score. In their study, 18 patients (14%) had local complications, 7 patients (5.4%) developed organ failure and mortality occurs in 2 patients. Score of > 3, had sensitivity of 71.4%, specificity of 99.1%, positive predictive value of 83.3 % and negative

predictive value of 98.3%. They found significant correlation between BISAP score and length of hospital stay.

Zhang J. et al[21], compared BISAP score with Ranson score and APACHE II score. Their study includes 155 patients of AP with severe disease among 16.7% patients and mortality among six (3.2%) patients. With increasing BISAP score, there were increasing trends of severity, pancreatic necrosis and mortality which was statistically significant ($p < 0.001$).

**PATHOPHYSIOLOGY-**

It is the final result of abnormal pancreatic enzyme activation. Intra-acinar activation of enzymes causes autodigestion of normal pancreatic parenchyma. Acinar cells release proinflammatory cytokines, which propagates response locally and systemically. Local inflammatory response increases the permeability and damages the microcirculation. It can cause local hemorrhage and pancreatic necrosis in severe cases.

**ETIOLOGY-**

There are many etiological factors of AP which can be easily identified with history / examination in majority of patients. Gallstones and alcohol abuse are the most frequent causes of acute pancreatitis (70-80%).[22] Etiological workup should be directed to first identify these two causes, if ruled out, and then proceed to other causes.

**ACUTE BILIARY PANCREATITIS –**

Gallstone-induced pancreatitis is most common cause of AP. The specific mechanism by which gallstones causes acute pancreatitis is still debated. Two theories have been proposed for mechanism of pancreatic injury[23,24], 1) Obstructive theory- obstruction of pancreatic duct by gall stones causes excess secretion of pancreatic juices resulting in pancreatic injury. 2) Reflux theory- stones become impacted in the ampulla of vater and form a

common channel which causes bile salt reflux into the pancrease. Gall stones may cause recurrent pancreatitis. Treatment by cholecystectomy eliminates the risk of recurrence.

**ALCOHOL INDUCED PANCREATITIS –**

Excessive alcohol intake is second most common cause of acute pancreatitis worldwide. It is most common cause of recurrent acute pancreatitis. It is more prevalent in young men than in women. It usually occurs after consumption over several years,[25] but a single large intake may be enough to trigger the inflammatory process.[26] Alcohol causes pancreatitis by inducing sphincter of oddi spasm and decreasing pancreatic perfusion. It also obstructs pancreatic ducts through the precipitation of proteins in ducts. Alcohol increases the expression and activity of caspases and also triggers proinflammatory pathways.

**ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAHY (ERCP) INDUCED PANCREATITIS –**

Acute pancreatitis is most common complication after ERCP, occurring in 2% to 9% of patients.[27] Risk increases in therapeutic procedures as compared to diagnostic procedures, patient related-factors are prior history of post-ERCP pancreatitis, history of recurrent pancreatitis, female gender, young age and suspected sphincter of Oddi dysfunction. The procedure related factors are difficult cannulation, biliary or pancreatic sphincter manometry, pancreatic duct injection, pancreatic sphincterotomy.

**ANATOMIC OBSTRUCTION –**

Periampulary obstruction could be due to periampullary tumor, polyp, diverticulum, sphincter of Oddi dysfunction, stenosis, crohn disease. Pancreatic duct obstruction caused by tumor, pancreatic mucinous cystic ectasia, non neoplastic stenosis. Congenital anomalies of pancrease such

as pancreas divisum or annular pancreas may sometimes cause pancreatitis.

**DRUG INDUCED PANCREATITIS –**

Antimicrobial agents such as tetracycline, erythromycin, Neuropsychiatric agents such as Valproic acid, α-methyl-Dopa; HIV therapy (Didanosine, pentamidine); Diuretics (furosemide, thiazides); metronidazole, sulfonamides, nitrofurantoin, isoniazid, GI drugs such as 5-ASA, sulphasalazine, cimetidine, ranitidine, mercaptopurine, proton-pump inhibitors; Cardiac agent Procainamide; Immunosuppressives or chemotherapeutics such as L-asparaginase, cytosine arabinoside, dexamethasone; Other commonly used agents such as Acetaminophen, salicylates, sulindac, calcium, norethindrone are frequently associated with acute pancreatitis.

**METABOLIC FACTORS –**

**Hyertriglyceridemia -** It accounts for 1.3% to 3.8% cases of pancreatitis.[28] It causes direct pancreatic injury by triglyceride metabolites. Triglyceride levels higher than 1000 mg/dl is suspicious of AP. Triglyceride levels higher than 2000 mg/dl confirms the diagnosis. Patients with pancreatitis due to severe hypertriglyceridemia should be screened for familial causes such as hyperlipidemia syndromes (type I, IV and V), thyroid stimulating hormone (TSH) levels, history of alcohol intake. We should look for history of medications that can cause hypertriglyceridemia such as steroids and valproic acid.

**Hypercalcemia –** It can occur in patients of hyperparathyroidism (HPT) and the most common cause of HPT is parathyroid adenoma. The occurrence of pancreatitis secondary to PHPT has prevalence of about 3.6%.[29] It causes pancreatic injury by activating trypsinogen to trypsin. Also, intraductal precipitation of calcium causes ductal obstruction and subsequent attack of pancreatitis.

**AUTOIMMUNE –**

Sjögren's syndrome, rheumatoid arthritis, primary biliary cirrhosis, renal tubular acidosis may cause acute pancreatitis.

**DIAGNOSIS –**

Diagnosis of AP requires detailed history taking and clinical assessment plus an elevation of pancreatic enzymes level.

**CLINICAL FEATURES –**

Epigastric and/or periumblical pain that radiates to back, relived by sitting and leaning forward is cardinal symptom of AP. Nausea / vomiting present in majority of patients that typically does not relieve the pain. Other features like poor skin turgor, dehydration and hypotension can present in AP. In mild cases, there may be none or only mild epigastric tenderness. In severe cases, abdominal distention may occur along with abdominal tenderness and rigidity. Other rare findings like flank and periumblical ecchymosis may be present. Left side pleural effusion is common in AP.

**PANCREATIC ENZYMES** –

Serum amylase and/or lipase levels at three times more than normal confirm the diagnosis. Half life of serum amylase is shorter than serum lipase, so lipase level is more sensitive. S. lipase is also more specific marker because amylase levels can also be increased in other conditions like intestinal ischemia, acute appendicitis, ruptured ectopic pregnancy, acute cholecystitis, common bile duct obstruction, and perforated viscous, salivary gland diseases and renal insufficiency.

**RADIOLOGY –**

Imaging in pancreatitis helps to clarify the diagnosis, to determine possible cause, to detect complications, to assess severity and determine prognosis.

**PLAIN RADIOGRAPH -**

Radiographs are insensitive for diagnosis of acute pancreatitis. Abdominal X ray may show non specific sign such as air-fluid levels suggestive of ileus (sentinel loop), colonic spasm at splenic flexure (colon cut off sign) and widening of duodenal C loop caused by severe pancreatic head edema. Chest radiographs may show pleural effusion, usually left sided, basal atelectasis, hemi diaphragm elevation, and pulmonary edema.

**ULTRASOUND –**

USG helps to identify areas of pancreatic necrosis, diagnosis of vascular complications, to identify gallstones as a possible cause and assessment of any other cause of an acute abdomen.

**CT ABDOMEN** –

It is best modality for evaluation of pancrease. It allows evaluation of the viability of pancreatic parenchyma. Increase in size of pancrease, pancreatic edema, inflammation and fat stranding may present. CT can show presence of liquefactive necrosis, infected necrosis, abscess formation, hemorrhage, calcification and any intraabdominal fluid collection.

**MRI ABDOMEN** –

It can also be used to evaluate the extent of necrosis, inflammation and presence of free fluid.

**MRCP –**

It visualizes complete biliary and pancreatic duct anatomy. It helps in evaluation of unexplained or recurrent pancreatitis. Secretion MRCP is further helpful in cases of pancreatic divisum, intraductal papillary neoplasm (IPMN), or tumour in the pancreatic duct.

## ASSESSMENT OF SEVERITY OF PANCREATITIS –

### RANSON PROGNOSTIC CRITERIA -

Ranson criteria is among earliest scoring system to evaluate the severity of acute pancreatitis, introduced in 1974.[4,14] but It requires data that needs 48 hour of hospitalization which can lead to delay in stratification of severity of acute pancreatitis. Severe acute pancreatitis indicated by score of more than 3.

**Criteria for acute pancreatitis secondary to gall stones -**

At admission –

1. Blood glucose levels > 220 mg/dl
2. Age of patient > 70 years
3. Lactate Dehydrogenase (LDH) levels > 400 IU/L
4. Aspartate Aminotransferase (AST) levels > 250 IU/L
5. Total leukocyte counts (TLC) > 18000/ mm3

Within 48 hours -

1. Serum Calcium levels < 8 mg%
2. Drop in Hematocrit >10%
3. Base deficit > 4 mEq/L
4. Rise in Blood Urea Nitrogen (BUN) levels > 2 mg%
5. Sequestrated fluid > 4 L

**Criteria for acute pancreatitis for causes other than gall stones -**

At admission:

1. Age of patient > 55 years
2. Total leukocyte counts (TLC) > 16000 cells/mm3
3. Blood glucose levels > 200 mg/dL
4. Aspartate Aminotransferase (AST) levels > 250 IU/100ml
5. Lactate Dehydrogenase (LDH) levels > 350 IU/L

Within 48 hours:

1. Serum calcium levels < 8.0 mg/dL
2. Drop in Hematocrit > 10%

3. Hypoxemia ( PaO2 < 60 mmHg)
4. Blood Urea Nitrogen (BUN) levels increased by ≥ 5 mg/dL after hydration
5. Base deficit > 4 mEq/L
6. Sequestration of fluids > 6 L

**GLASGOW-IMRIE PROGNOSTIC CRITERIA –**

This criterion is proposed by making changes in Ranson's criteria for acute pancreatitis. Originally, it consists of 9 factors, which were reduced to 8 factors due to a better predictive value.

If three or more criteria present, it indicates severe pancreatitis. It includes-

1. PaO2 < 8 kPa
2. Age of patient > 55 years
3. Total leukocyte counts (TLC) > 15000 cells/mm3
4. Calcium levels < 2 mmol/L
5. Blood Urea Nitrogen (BUN) levels > 16 mmol/L
6. LDH > 600 IU/L or AST >200 IU/L
7. Albumin < 3.2 g/dL
8. Blood Glucose levels >10 mmol/L

**ACUTE PHYSIOLOGY AND CHRONIC HEALTH EVALUATION (APACHE II) SCORE –**

APACHE II Score was used to measure severity of any disease for hospitalized patients under intensive care.[30] It can be calculated any time during hospital stay. But it requires many parameters to calculate. All of these parameters are not relevant in acute pancreatitis.[9,10] This score is calculated from patient's age and 12 routine physiological measurements. It includes age of patient, temperature of patient; mean arterial pressure (MAP), arterial pH, heart rate (HR), respiratory rate (RR), Pa02, serum potassium levels, serum sodium levels, serum creatinine levels, Hematocrit level, total leukocyte count and Glasgow coma scale score.

**MODIFIED CT SEVERITY INDEX** [31] **-**

It is a modification of CT severity index (CTSI) that was introduced in 1994 by Balthazar and colleagues. It correlates well with development of organ failure and duration of hospital stay. Scores are based on pancreatic inflammation, pancreatic necrosis and presence/absence of extra pancreatic complication. 0-2 is mild, 4-6 is moderate and 8-10 is severe.

**Pancreatic inflammation –**

0: Normal pancreas

2: Pancreatic abnormalities with or without peripancreatic inflammatory changes

4: Fluid collection in pancreatic or peripancreatic region or peripancreatic fat necrosis

**Pancreatic necrosis** – 0: If no necrosis, 2: Less than 30% necrosis, 4: more than 30% necrosis

**Extra pancreatic complications –**

2: one or more of ascites, vascular complications, pleural effusion, parenchymal complications and/or gastrointestinal involvement.

**REVISED ATLANTA CLASSIFICATION, 2012** [32] **–**

The Revised Atlanta classification of acute pancreatitis, 2012 is an update of the 1992 Atlanta classification. It is a multidisciplinary, international classification of the severity of acute pancreatitis.

**Phases of acute pancreatitis –**

**1. Early phase** – it usually lasts for first week but may extend into second week. Local pancreatic injury / inflammation leads to Cytokine cascades which present as systemic inflammatory response syndrome (SIRS).

**2. Late phase -** it has got a protracted course of many weeks to months with local complications and organ failure. Late phase does not occur in mild form of pancreatitis but only in moderately severe or severe grade of acute pancreatitis.

**Types of acute pancreatitis –**

Acute pancreatitis is now classified into two distinct subtypes based on the absence or presence of necrosis.

**1. Acute interstitial edematous pancreatitis –**

There is an acute inflammation in the parenchyma of pancrease and in peripancreatic tissues, but without any tissue necrosis. It has mortality of less than 1%.

**2. Acute necrotizing pancreatitis –**

It is pancreatic parenchymal necrosis and/or peripancreatic necrosis. It may be sterile necrosis or infected necrosis. Sterile necrosis has <10% mortality but infected necrosis has > 40% mortality.

**Severity grading of acute pancreatitis –**

It may be classified as mild, moderately severe or severe.

**Mild AP –** It is absence of organ failure and absence of local or systemic complications. These patients usually got discharge during the early phase and do not require pancreatic imaging, and risk of mortality is very low.[15]

**Moderately severe AP –** it is transient organ failure that is presence of organ failure for less than 48 h. Any local and systemic complications may or may not be present. It may resolve without intervention or it may need prolonged intensive care. Mortality is less in moderately severe when compared to that of severe AP.[33]

**Severe AP -** It is persistent organ failure that is presence of organ failure for more than 48 h. If patient develop persistent organ failure within first few days, risk of death increases with high mortality rate.[34]

**ORGAN FAILURE -** Organ failure is going to be defined as a score of two or more for one among the following three systems (respiratory, cardiovascular, and renal) as per Modified Marshall scoring system. Duration of organ failure is going to be taken as either transient (≤ 48 hrs) or persistent (>48 hrs). If failure occurs in more than 1 organ, it is termed as multiple organ failure (MOF).

| ORGAN SYSTEM | SCORE | | | | |
|---|---|---|---|---|---|
| | **0** | **1** | **2** | **3** | **4** |
| **Respiratory (PaO2 / FiO2)** | >400 | 301-400 | 201-300 | 101-200 | <101 |
| **Renal (serum creatinine, mg/dl)** | <1.4 | >1.4 to<1.8 | >1.9 to<3.6 | >3.6 to<4.9 | >4.9 |
| **Cardiovascular (SBP, mm hg)** | >90 | <90, fluid responsive | <90, fluid unresponsive | <90, ph<7.3 | <90, ph<7.2 |

**Fluid collections associated with interstitial edematous pancreatitis –**

1. **Acute peripancreatic fluid collections (APFC)** –

It is non encapsulated fluid collection in peripancreatic region. It is associated with interstitial edematous pancreatitis. There is no associated peripancreatic necrosis. It is seen in first four weeks after onset. It is confined by normal peripancreatic fascial planes. It may be sterile or infected. Treatment is usually supportive as most fluid collections resolved spontaneously. If infection, suggested by fever, elevated TLC, and persistent abdominal pain, it needs percutaneous drainage and intravenous antibiotics.

**2. Pancreatic pseudocysts –**

It is an encapsulated fluid collection in peripancreatic region. It is associated with interstitial edematous pancreatitis. It has a well defined inflammatory wall. There is minimal or no necrosis. It occurs after 4 weeks of onset. Persistent pain, early satiety, nausea, weight loss, and elevated pancreatic enzymes levels suggest formation of pseudocyst. Characteristic feature is high amylase levels with absence of mucin and low carcinoembryogenic antigens (CEA) levels. Observation is indicated as mostly get self resolved. Rest can be treated by internal (such as cystogastrostomy or cystojejunostomy) or external drainage.

**Fluid collections associated with necrotizing pancreatitis** –

**3. Acute necrotic collections (ANCs) –**

It is non-encapsulated collection with heterogeneous non-liquefied material. Necrosis can involve pancreatic parenchyma and/or the peripancreatic tissues. It occurs in the first 4 weeks after onset of necrotizing pancreatitis.

**4. Walled-off (pancreatic) necrosis (WON or WOPN) –**

It is encapsulated collection with a well defined inflammatory wall of pancreatic and/or peripancreatic necrosis. It occurs after 4 weeks after onset of necrotizing pancreatitis. The main complication of pancreatic necrosis is infection. It is suspected in patients with prolonged fever, elevated TLC, or progressive clinical deterioration. It can be confirmed by fine needle aspiration cytology (FNAC). Once confirmed, intravenous antibiotics should be given. Carbapenems are drug of choice. It can be treated by open surgical debridement with necrosectomy or by less invasive laparoscopic or endoscopic procedures.

# MATERIALS AND METHODS

## SOURCE OF DATA

This prospective study was conducted on 50 consecutive patients diagnosed as acute pancreatitis and admitted through emergency in Dayanand Medical College & Hospital (DMC&H), Ludhiana. BISAP score was calculated based on data collected within 24 hours of hospitalization of patient, and then patients were followed throughout hospitalization for development of Severe Acute Pancreatitis.

## METHOD OF COLLECTION OF DATA

### DIAGNOSIS:

If any two of the following three was present, patient was considered as case of acute pancreatitis.

1) Characteristic pain that is epigastric and/or periumblical pain that radiates to back and relived by sitting and leaning forward.

2) Serum amylase and/or lipase level at least 3 times above normal.

3) Findings on ultrasound abdomen and/or computerized tomography (CT) scan abdomen and /or magnetic resonance imaging (MRI) scan of abdomen characteristic of acute pancreatitis.

BISAP score was calculated using data of patients collected within first 24hrs of admission in our hospital.

### SEVERITY GRADING OF ACUTE PANCREATITIS:

Severity of acute pancreatitis was defined on the basis of Revised Atlanta Classification, 2012. It was classified as mild, moderately severe or severe. Organ failure was defined as a score of two or more for one among the following three systems (respiratory, cardiovascular, and renal) as per Modified Marshall scoring system. Organ failure score was calculated for all cases of acute pancreatitis during each 24 hour duration or on the basis of clinical measurement and maximum laboratory results within 72 hrs of admission to our hospital. Duration of organ failure was taken as

either transient (≤ 48 hrs) or persistent (>48 hrs). Multiple organ failure (MOF) was defined as organ failure affects more than one organ system.

**INCLUSION CRITERIA**

Patients diagnosed as case of acute pancreatitis, admitted in emergency department of Dayanand Medical College & Hospital (DMC&H) and willing to participate in study after informed consent.

**EXCLUSION CRITERIA**

Patient having history / features of chronic pancreatitis and acute on chronic pancreatitis were excluded from this study.

**OUTCOME**

Outcome of this study is to find the cutoff value of the BISAP score to predict severity of disease progression in cases of Acute Pancreatitis.

**STATISTICAL ANALYSIS**

In this study, data was expressed in terms median, frequencies (number of cases) and relative frequencies (percentages); range; mean ±standard deviation (± SD). For comparison of quantitative variables between the study groups, Student t-test was done. For comparison of categorical data, Chi square ($\chi 2$) test was done. If expected frequency was less than 5, exact test was done. A probability value (p value) of less than 0.05 was considered as statistically significant. All statistical calculations for this study were done in Microsoft Windows SPSS (Statistical Package for the Social Science) SPSS 21 version.

# OBSERVATIONS AND RESULTS

This study was conducted on 50 consecutive patients diagnosed as case of acute pancreatitis. BISAP score was calculated based on data obtained within 24 hours of hospitalization. Following results were obtained from the collected data.

**DEOGRAPHIC DATA –**

**AGE –**

The range of age was from 17 to 76 years with a mean age of 41.8 years with standard deviation of 15.7 years. Maximum patients are in age group of 31-50 years (42.0%). Mean age of patients increase with increase in BISAP score with significant p-value (0.016).

**Table 1 - Prevalence of acute pancreatitis in various age groups**

| Age group | No. of cases | Percentage |
|---|---|---|
| < 30 | 14 | 28.0% |
| 31-50 | 21 | 42.0% |
| > 50 | 15 | 30.0% |
| Total | 50 | 100.0% |

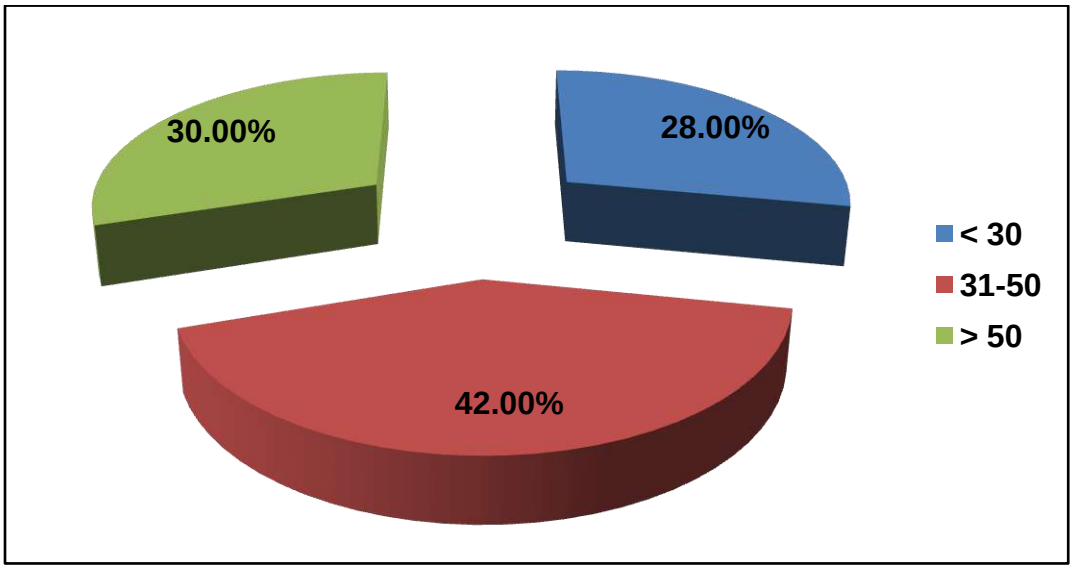


**Figure 1 - Prevalence of acute pancreatitis in various age groups**

**Table 2 – Range of age among study population**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Age | 50 | 17.0 | 76.0 | 41.8 | 15.7 |

**Table 3 – Mean age among study group according to BISAP Score**

| BISAP | 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Age | 35.09 | 11.95 | 40.11 | 11.72 | 41.07 | 17.99 | 53.40 | 18.32 | 70.00 | 0.00 |

**SEX –**

There was a male predominance among study population. Out of 50 patients, 33 were male (66.0%) and 34 were female (34.0%).

**Table 4 - Gender wise distribution of acute pancreatitis**

| Sex | No. of cases | Percentage |
|---|---|---|
| Male | 33 | 66.0% |
| Female | 17 | 34.0% |
| Total | 50 | 100.0% |

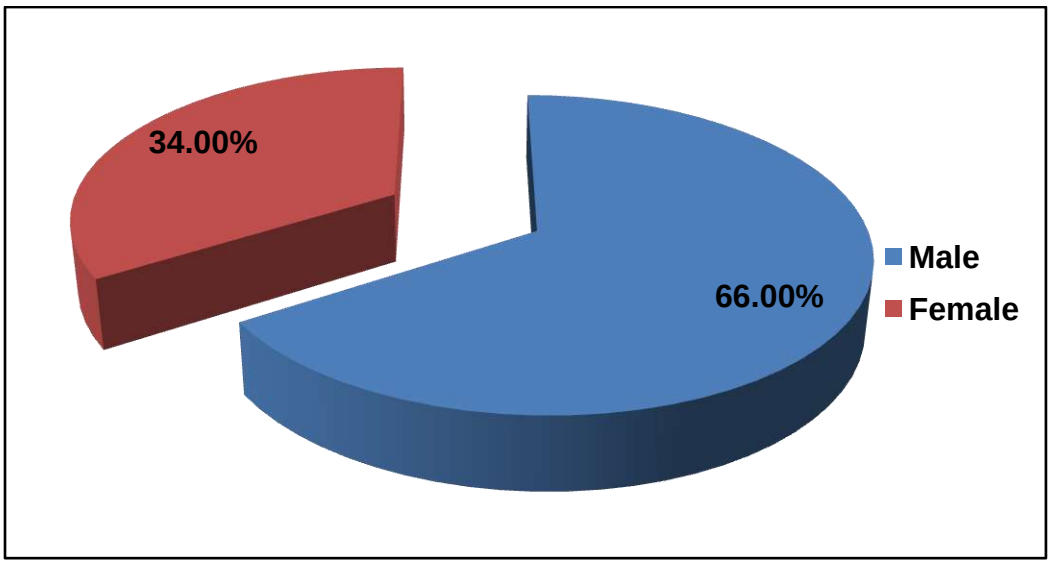


**Figure 2 - Gender wise distribution of acute pancreatitis**

**SYMPTOMS OF ACUTE PANCREATITIS** –

Epigastric and/or periumblical pain that radiates to back, relived by sitting and leaning forward is cardinal symptom of AP. All the 50 patients presented with pain abdomen with or without pain radiation to back. Symptoms of nausea /vomiting present in 17 (34.0%) patients.

**Table 5 - Symptoms of acute pancreatitis among study group**

| Symptoms | No. of cases | Percentage |
|---|---|---|
| Pain abdomen | 50 | 100.0% |
| Vomiting | 17 | 34.0% |
| Fever | 3 | 6.0% |
| Breathlessness | 4 | 8.0% |

**CLINICAL FINDINGS IN ACUTE PANCREATITIS –**

Tenderness on abdominal palpation present in 27 (54.0%) patients while guarding / rigidity present in 6 (12.0%) cases.

**Table 6 - Clinical findings in acute pancreatitis among study group**

| Abdomen | No. of cases | Percentage |
|---|---|---|
| Tender | 27 | 54.0% |
| Guarding/rigidity | 6 | 12.0% |

**ETIOLOGY –**

The leading cause of acute pancreatitis in our study is gall stones, with maximum 26 (52.0%) cases. Second most common cause is alcohol with 11 (22.0%) cases. Other causes are drugs, hypercalcemia, autoimmune and trauma. 8 cases are idiopathic in nature.

**Table 7 - Distribution of acute pancreatitis on the basis of etiology**

| Etiology | No. of cases | Percentage |
|---|---|---|
| Biliary | 26 | 52.0% |
| Alcohol | 11 | 22.0% |
| Drug | 2 | 4.0% |
| Hypercalcemia | 1 | 2.0% |
| Autoimmune | 1 | 2.0% |
| Trauma | 1 | 2.0% |
| Idiopathic | 8 | 16.0% |
| Total | 50 | 100.0% |

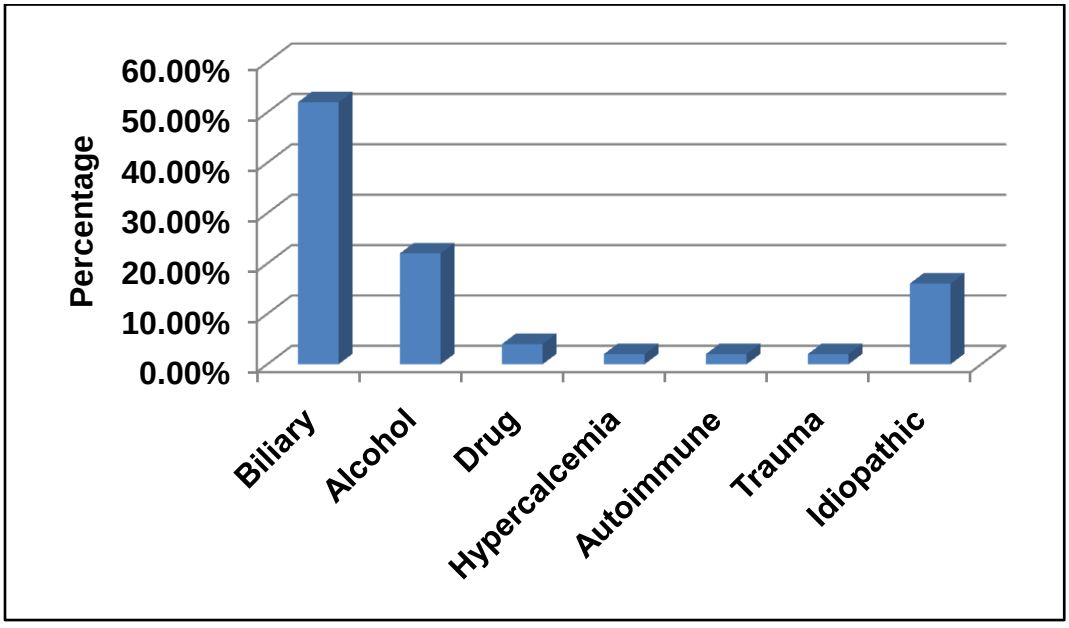


**Figure 3 - Distribution of acute pancreatitis on the basis of etiology**

**DISTRIBUTION OF CASES ACCORDING TO BISAP SCORE –**

In our study, BISAP score was calculated based on data obtained within 24 hours of hospitalization. Maximum patients have score of 2 and 3. 18 patients have score 2 and 14 patients have score 3.

**Table 8 - Distribution of cases of acute pancreatitis according to BISAP score**

| BISAP Score | cases | Percentage |
|---|---|---|
| 1 | 11 | 22.0% |
| 2 | 18 | 36.0% |
| 3 | 14 | 28.0% |
| 4 | 5 | 10.0% |
| 5 | 2 | 4.0% |
| Total | 50 | 100.0% |

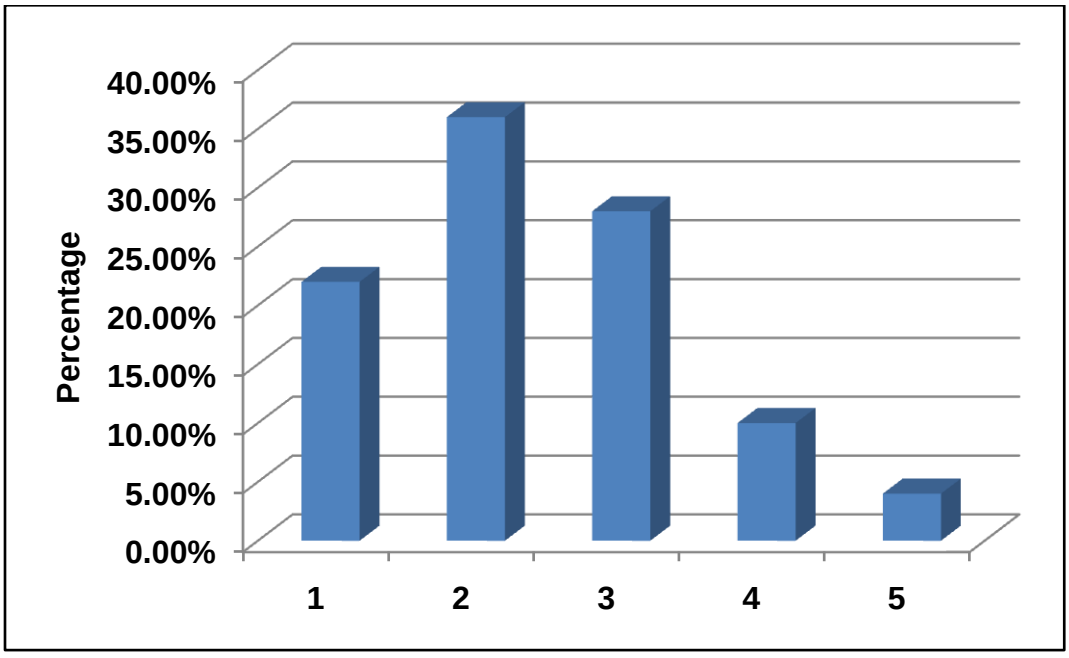


**Figure 4 - Distribution of cases of acute pancreatitis according to BISAP score**

**DISTRIBUTION OF CASES ACCORDING TO REVISED ATLANTA CLASSIFICATION –**

All 50 cases classified as mild, moderately severe and severe pancreatitis according to Revised Atlanta classification. 27 (54.0%) are mild, 14 (28.0%) cases are moderately severe and 9 (18.0%) cases are severe.

**Table 9 - Distribution of cases of acute pancreatitis according to Revised Atlanta classification**

| Type | No. of cases | Percentage |
|---|---|---|
| Mild | 27 | 54.0% |
| Moderately severe | 14 | 28.0% |
| Severe | 9 | 18.0% |
| Total | 50 | 100.0% |

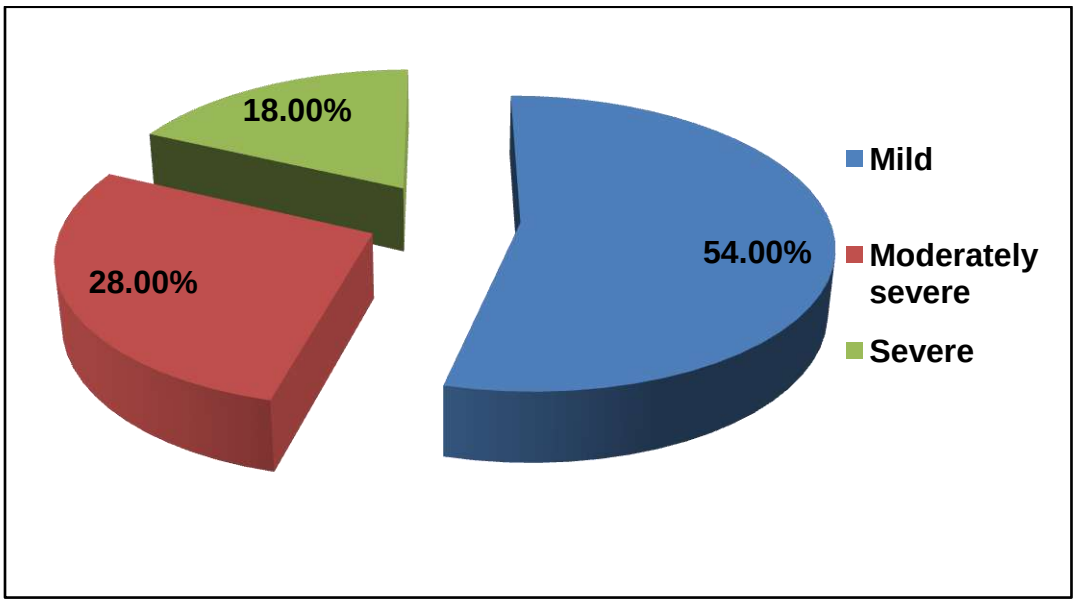


**Figure 5 - Distribution of acute pancreatitis according to Revised Atlanta classification**

**INCIDENCE OF SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) –**

In our study population, SIRS is most common component of BISAP score, present in 47 (94.0%) cases.

**Table 10 - Incidence of SIRS among study group**

| SIRS | No. of cases | Percentage |
|---|---|---|
| Yes | 47 | 94.0% |
| No | 3 | 6.0% |
| Total | 50 | 100.0% |

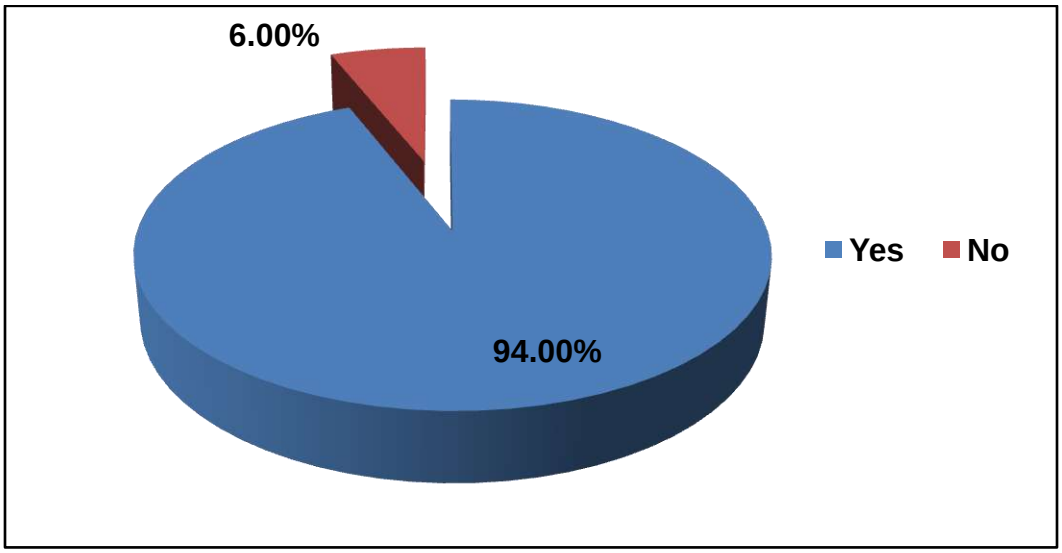


**Figure 6 - Incidence of SIRS among study group**

**INCIDENCE OF MULTIPLE ORGAN DYSFUNCTION SYNDROME (MODS) –**

It is development of organ failure involving two or more organ systems. In our study, 3 patients have MODS. 1 patient has score of four and 2 patients have score of five.

**Table 11 - Incidence of MODS among study group**

| MODS | No. of cases | Percentage |
|---|---|---|
| Yes | 3 | 6.0% |
| No | 47 | 94.0% |
| Total | 50 | 100.0% |

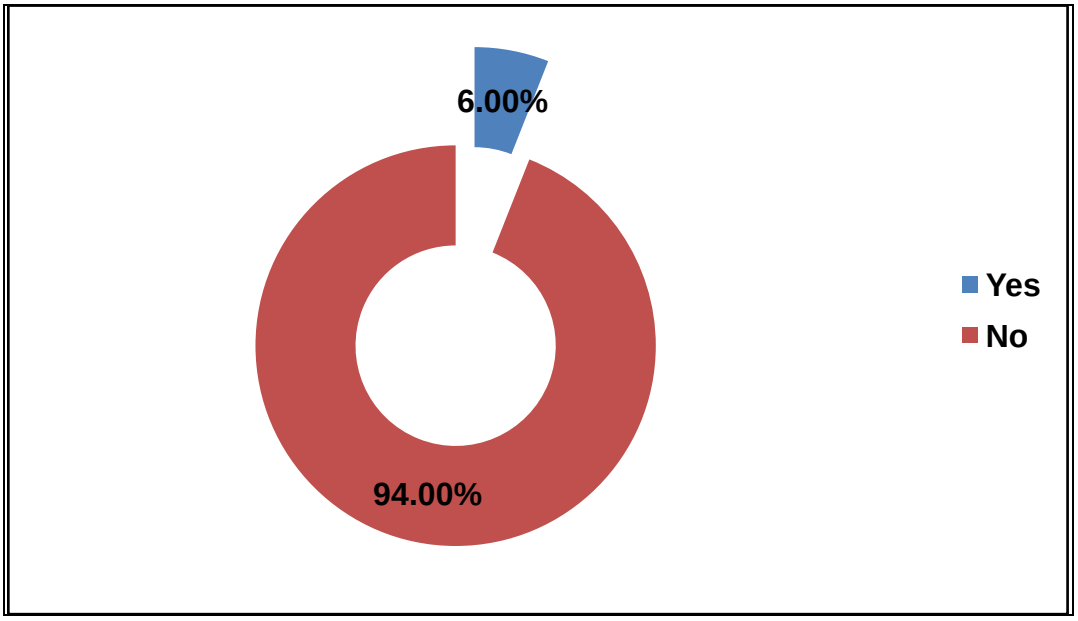


**Figure 7 - Incidence of MODS among study group**

**PLEURAL EFFUSION IN ACUTE PANCREATITIS –**

Pleural effusion, specially left side is common in acute pancreatitis. In this study, 27 (54.0%) patients have pleural effusion.

**Table 12- Pleural effusion among study group**

| Pleural effusion | No. of cases | Percentage |
|---|---|---|
| Yes | 27 | 54.0% |
| No | 23 | 46.0% |
| Total | 50 | 100.0% |

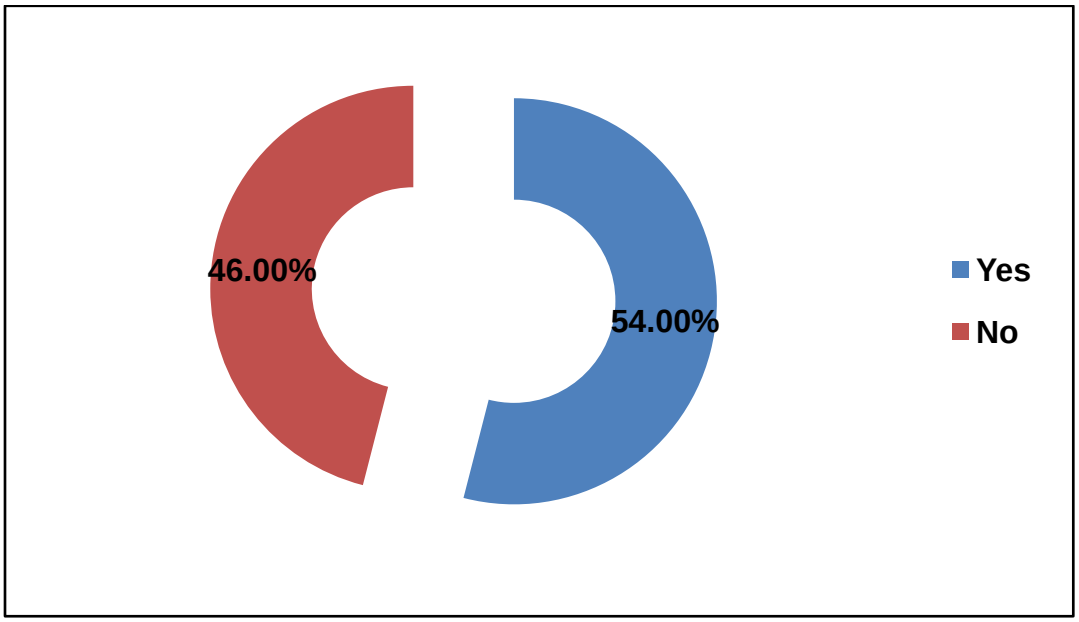


**Figure 8 - Pleural effusion among study group**

**PANCREATIC NECROSIS IN ACUTE PANCREATITIS –**

In this study, pancreatic necrosis present in 12 (24.0%) cases. At < 3 score, necrosis present only in 3 cases, while at ≥ 3, necrosis present in 9 cases. Thus incidence of pancreatic necrosis rises at score ≥ 3. This correlation has significant p-value (0.008).

**Table 13 - Pancreatic necrosis among study group**

| Pancreatic necrosis | No. of cases | Percentage |
|---|---|---|
| Yes | 12 | 24.0% |
| No | 38 | 76.0% |
| Total | 50 | 100.0% |

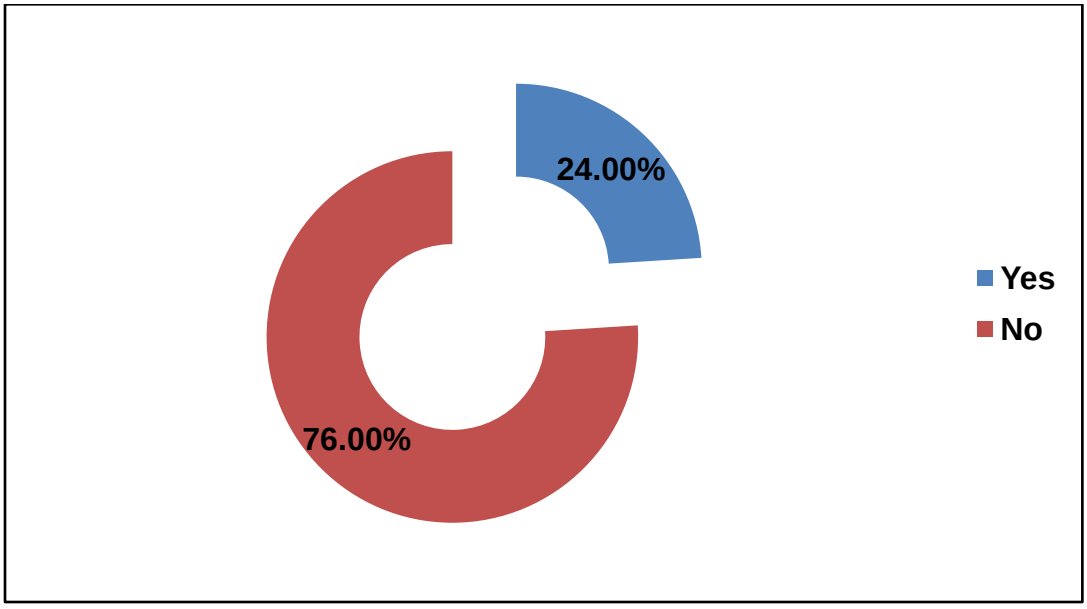


**Figure 9 - Pancreatic necrosis among study group**

**Table 14 - Distribution of pancreatic necrosis among study group according to BISAP score**

| | BISAP Score | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|
| | < 3 | | ≥ 3 | | | | |
| Yes | 3 | 10.3% | 9 | 42.9% | 12 | 7.059 | 0.008 |
| No | 26 | 89.7% | 12 | 57.1% | 38 | | |
| Total | 29 | 100.0% | 21 | 100.0% | 50 | | |

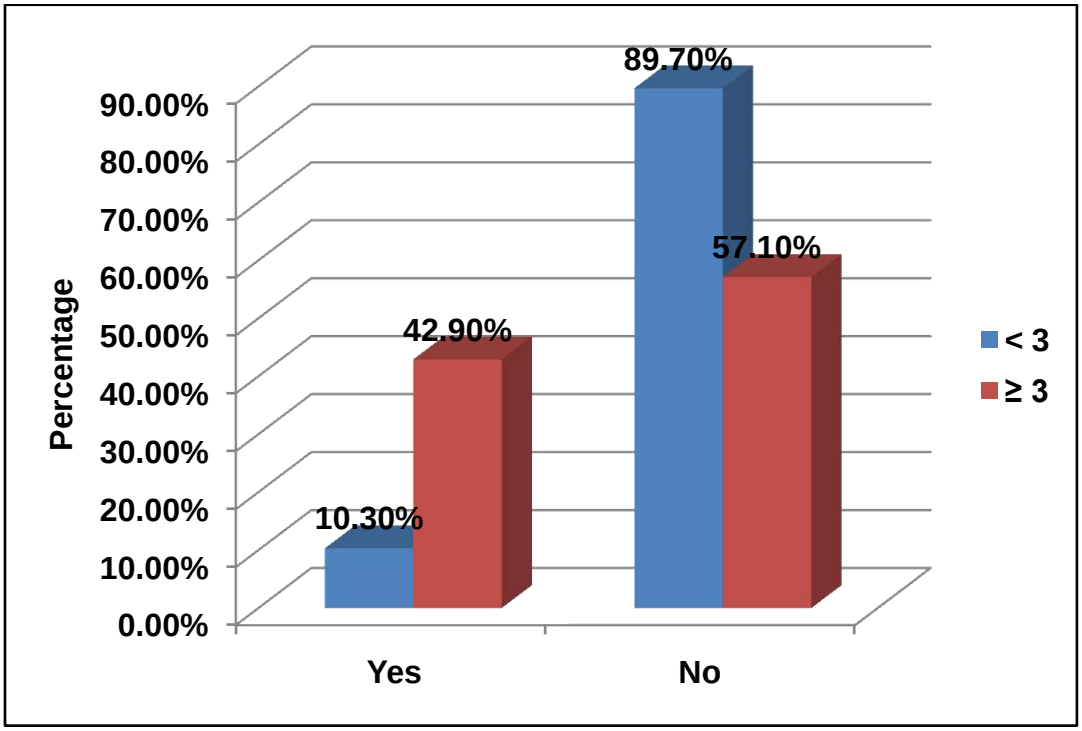


**Figure 10 - Distribution of pancreatic necrosis among study group according to BISAP score**

**MORTALITY –**

In this study, only 1 mortality present at BISAP score of 4. This patient had respiratory, renal and cardiac failure.

**Table 15 - Mortality among study population**

| Outcome | No. of cases | Percentage |
|---|---|---|
| Death | 1 | 2.0% |
| Recovered | 49 | 98.0% |
| Total | 50 | 100.0% |

**HOSPITAL STAY –**

Mean duration of hospital stay among study group increase with increasing BISAP Score but it is statistically not significant (p-value - 0.318). Mean duration for score < 3 is 11.24 days and for score ≥ 3 is 14.33 days but it is also statistically not significant (p-value - 0.156).

**Table 16 - Duration of hospital stay among study group according to BISAP Score**

| BISAP | 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Duration | 10.00 | 5.08 | 12.00 | 9.49 | 13.57 | 5.98 | 13.40 | 8.17 | 22.00 | 4.24 |

**Table 17 - Duration of hospital stay at BISAP score < 3 and ≥ 3**

| BISAP Score | < 3 | | ≥ 3 | | t | p-value |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| Duration | 11.24 | 8.05 | 14.33 | 6.64 | -1.440 | 0.156 |

**ORGAN FAILURE –**

Organ failure was defined as a score of two or more for one among the following three systems (respiratory, cardiovascular, and renal) as per Modified Marshall scoring system. It was taken as either transient (≤ 48 hrs) or persistent (>48 hrs) organ failure. Among 50 cases in our study, transient organ failure present in 14 (28.0%) cases, persistent organ failures present in 9 (28.0%) cases and 27 (54.0%) cases have no organ failure. At score <3, there are 4 (13.8%) cases of transient organ failure and no case of persistent organ failure. At score ≥ 3, there are 10 (47.6%) cases of transient and 9 (42.9%) cases of persistent organ failure. Thus at score ≥ 3, there is increase risk of organ failure and it is statistically significant (p-value – 0.00).

**Table 18 - Distribution of organ failure among study group**

| Type | No. of cases | Percentage |
|---|---|---|
| Transient | 14 | 28.0% |
| Persistent | 9 | 18.0% |
| No | 27 | 54.0% |
| Total | 50 | 100.0% |

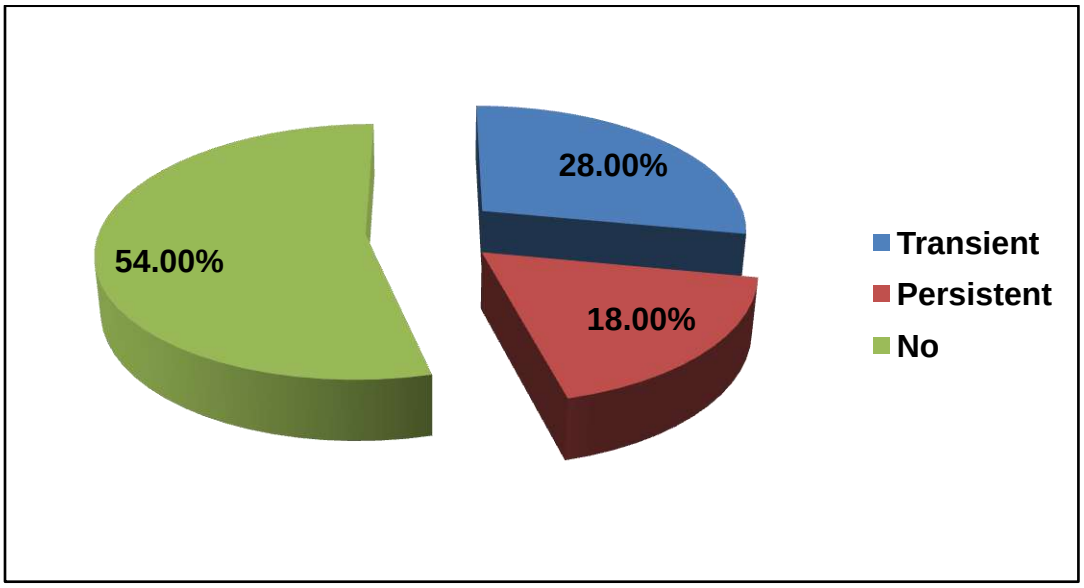


**Figure 11 - Distribution of organ failure among study group**

**Table 19 – Distribution of transient / persistent organ failure among study group according to BISAP Score**

| | BISAP Score | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** |
| Transient | 0 | 4 | 9 | 1 | 0 |
| Persistent | 0 | 0 | 3 | 4 | 2 |
| No | 11 | 14 | 2 | 0 | 0 |

**Table 20 - Distribution of transient / persistent organ failure at BISAP score < 3 and ≥ 3**

| | BISAP Score | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|
| | **< 3** | | **≥ 3** | | | | |
| Transient | 4 | 13.8% | 10 | 47.6% | 14 | 30.669 | 0.000 |
| Persistent | 0 | 0.0% | 9 | 42.9% | 9 | | |
| No | 25 | 86.2% | 2 | 9.5% | 27 | | |

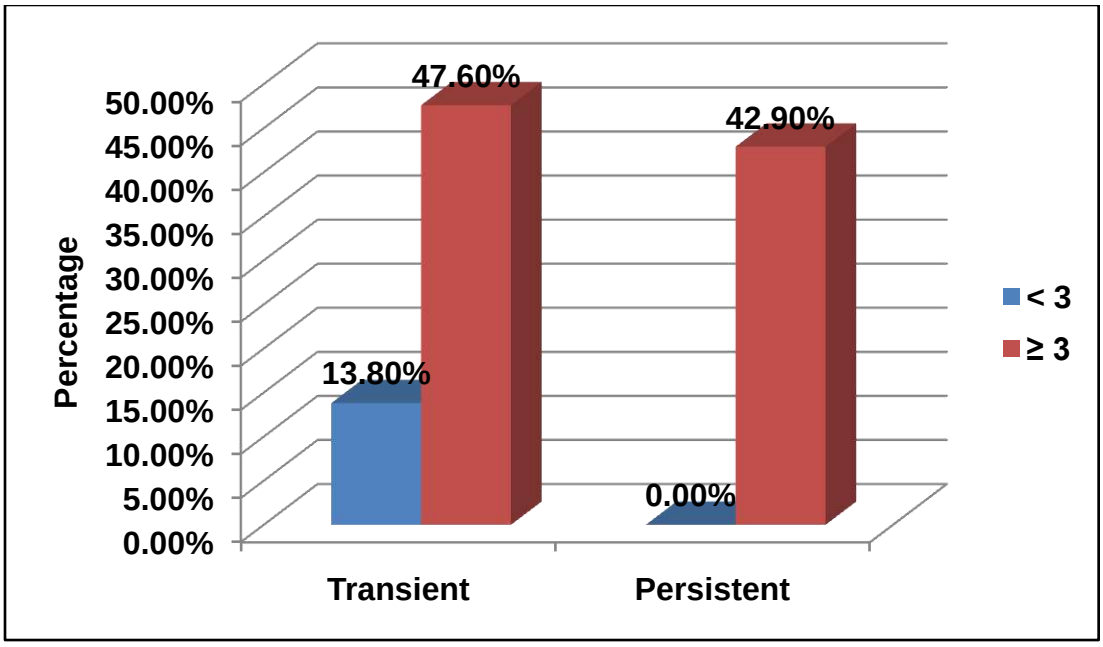


**Figure 12 - Distribution of transient / persistent organ failure at BISAP score < 3 and ≥ 3**

**TYPE OF ORGAN FAILURE –**

In this study, 22 (44.0%) case have respiratory, 3 (6.0%) cases have renal and 2 (4.0%) cases have cardiovascular organ failure.

**Table 21 - Type of organ failure among study group**

| Organ failure | No. of cases | Percentage |
|---|---|---|
| Respiratory | 22 | 44.0% |
| Renal | 3 | 6.0% |
| Cardiovascular | 2 | 4.0% |

**RESPIRATORY FAILURE –**

In this study, at score <3, there are 3 (10.3%) and at ≥ 3, there are 19 (90.5%) cases of respiratory failure. Thus at score ≥ 3, risk of respiratory failure increases and it is statistically significant (p-value – 0.00).

**Table 22 - Distribution of respiratory organ failure among study group according to BISAP Score**

| | BISAP Score | | | | | Total |
|---|---|---|---|---|---|---|
| **Respiratory** | **1** | **2** | **3** | **4** | **5** | |
| Yes | 0 | 3 | 12 | 5 | 2 | 22 |
| No | 11 | 15 | 2 | 0 | 0 | 28 |

**Table 23 - Distribution of respiratory organ failure at BISAP score < 3 and ≥ 3**

| | BISAP Score | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|
| **Respiratory** | **< 3** | | **≥ 3** | | | | |
| Yes | 3 | 10.3% | 19 | 90.5% | 22 | 31.740 | 0.000 |
| No | 26 | 89.7% | 2 | 9.5% | 28 | | |

**RENAL FAILURE –**

In this study, at score <3, there is no case of renal failure and at ≥ 3; there are 3 (14.3%) cases of renal failure. One case occurs at score of 4 and two cases occur at score of 5. Increase in renal failure at ≥ 3 is not statistically significant (0.068).

**Table 24 - Distribution of renal organ failure among study group according to BISAP Score**

| | BISAP Score | | | | | Total |
|---|---|---|---|---|---|---|
| **Renal** | **1** | **2** | **3** | **4** | **5** | |
| Yes | 0 | 0 | 0 | 1 | 2 | 3 |
| No | 11 | 18 | 14 | 4 | 0 | 47 |

**Table 25 - Distribution of renal organ failure at BISAP score < 3 and ≥ 3**

| | BISAP Score | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|
| **Renal** | **< 3** | | **≥ 3** | | | | |
| Yes | 0 | 0.0% | 3 | 14.3% | 3 | 4.407 | 0.068 |
| No | 29 | 100.0% | 18 | 85.7% | 47 | | |

**CARDIOVASCULAR FAILURE –**

In this study, there is one case of cardiovascular failure at score of 2 and one case at score of 4. Increase in cardiovascular failure at ≥ 3 is not statistically significant (0.815).

**Table 26 - Distribution of cardiovascular organ failure among study group according to BISAP Score**

| | BISAP Score | | | | | Total |
|---|---|---|---|---|---|---|
| **Cardiovascular** | **1** | **2** | **3** | **4** | **5** | |
| Yes | 0 | 1 | 0 | 1 | 0 | 2 |
| No | 11 | 17 | 14 | 4 | 2 | 48 |

**Table 27 - Distribution of cardiovascular organ failure at BISAP score < 3 and ≥ 3**

| | BISAP Score | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|
| **Cardiovascular** | **< 3** | | **≥ 3** | | | | |
| Yes | 1 | 3.4% | 1 | 4.8% | 2 | 0.055 | 0.815 |
| No | 28 | 96.6% | 20 | 95.2% | 48 | | |

**PROGNOSIS ACCORDING TO BISAP SCORE –**

In our study, BISAP Score calculated on the basis of data collected with 24 hours of admission and then all cases were followed during hospital stay and classified as mild, moderately severe and severe pancreatitis according to Revised Atlanta classification. At score < 3, there are 25 (86.2%) mild and 4 (13.8%) moderately severe cases. At score ≥ 3, there are 2 (9.5%) mild, 10 (47.6%) moderately severe and 9 (42.9%) severe cases. Thus, at score ≥ 3, there is increased risk of moderately severe and severe pancreatitis and it is statistically significant (p-value – 0.00).

**Table 28 - Prognosis of patients according to BISAP score**

| | BISAP Score | | | | | Total |
|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | |
| Mild | 11 | 14 | 2 | 0 | 0 | 27 |
| Moderately severe | 0 | 4 | 9 | 1 | 0 | 14 |
| Severe | 0 | 0 | 3 | 4 | 2 | 9 |
| Total | 11 | 18 | 14 | 5 | 2 | 50 |

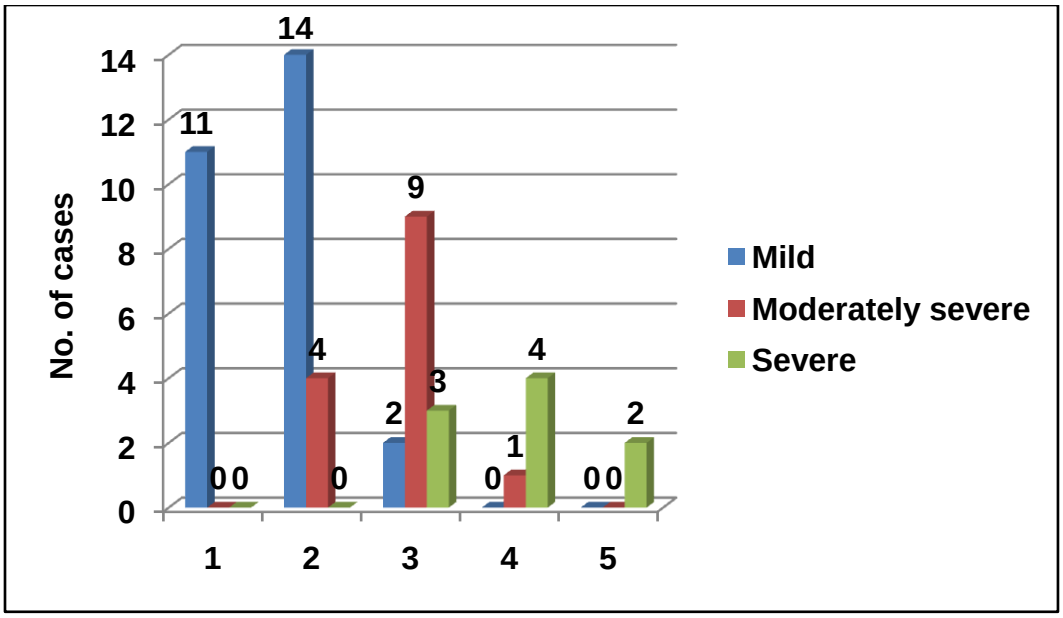


**Figure 13 - Prognosis of patients according to BISAP score**

**Table 29 - Prognosis of patients at BISAP score < 3 and ≥ 3**

| | BISAP Score | | | | Total | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|
| | < 3 | | ≥ 3 | | | | |
| Mild | 25 | 86.2% | 2 | 9.5% | 27 | 30.669 | 0.000 |
| Moderately severe | 4 | 13.8% | 10 | 47.6% | 14 | | |
| Severe | 0 | 0.0% | 9 | 42.9% | 9 | | |

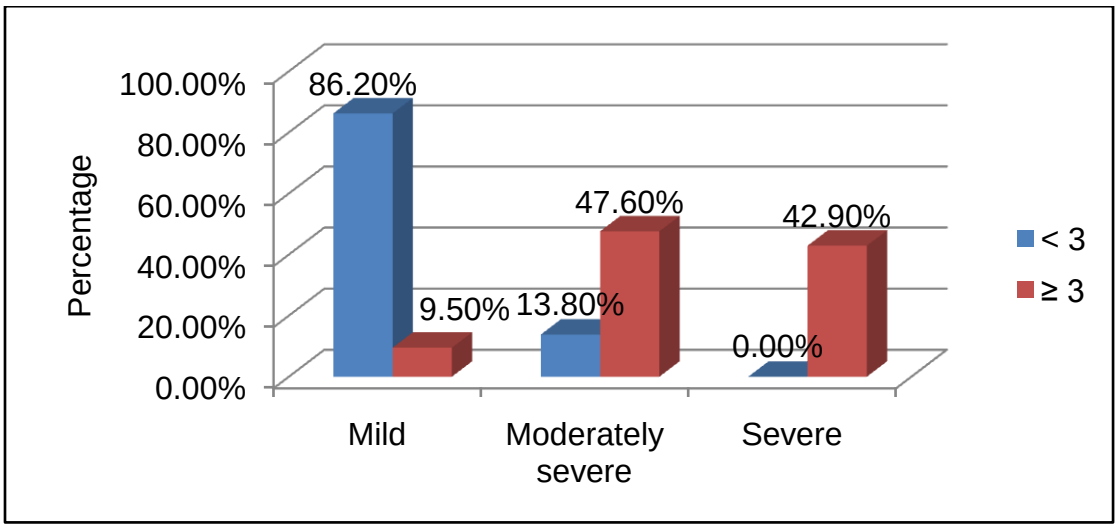


**Figure 14 - Prognosis of patients at BISAP score < 3 and ≥ 3**

# DISCUSSION

In our hospital, acute pancreatitis is among the commonest causes of acute abdomen. It is a disease with variable manifestation and clinical course.

**AGE –**

The mean age of our study population is 41.8 years. It is comparable to other studies done earlier. It is comparable to study by Choudhuri G et al (44.9 years).

**Table 30 – Comparison of mean age of presentation with other studies**

| Study | Mean age (years) |
|---|---|
| Buchler MW et al[35] | 55.1 |
| Chen et al[36] | 53.6 |
| Pupelis G et al[37] | 47 |
| Choudhuri G et al[38] | 44.9 |
| This study | 41.8 |

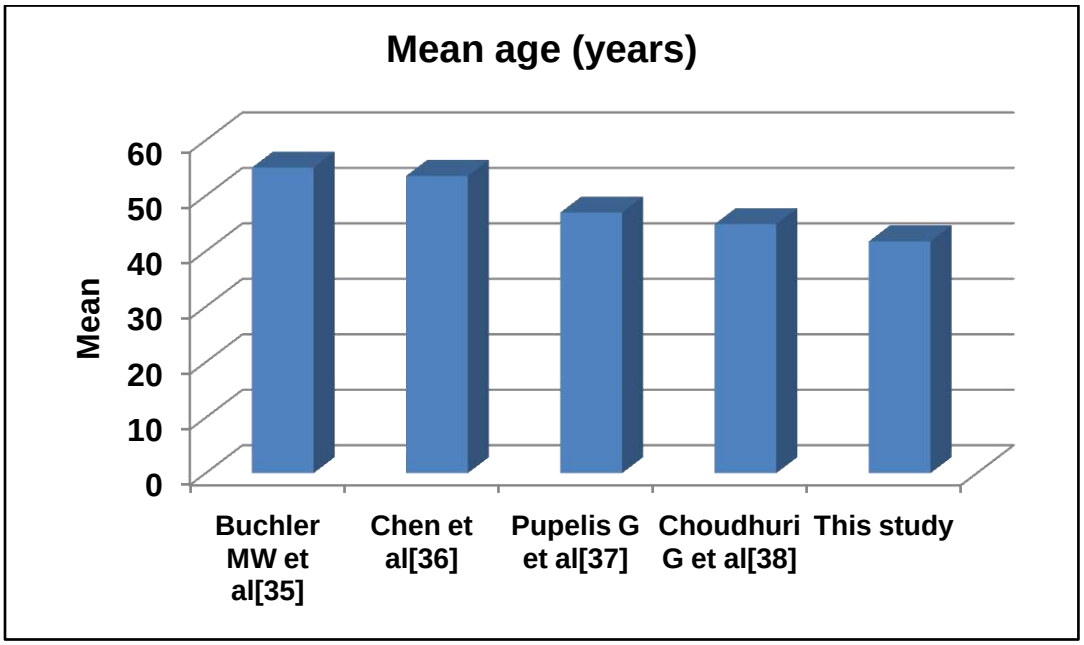


**Figure 15 – Comparison of mean age of presentation with other studies**

**SEX –**

There was a male predominance in our study with 33 (66.0%) male and 17 (34.0%) female. It is comparable to study by Buchler MW et al[35] and Choudhuri G et al.[38]

**Table 31 - Comparison of gender wise distribution with other studies**

| Study | Male (%) | Female (%) |
|---|---|---|
| Chen et al[36] | 55.3 | 44.7 |
| Buchler MW et al[35] | 61 | 39 |
| Choudhuri G et al | 66.6 | 33.3 |
| Pupelis G et al[37] | 73.7 | 26.3 |
| This study | 66.0 | 34.0 |

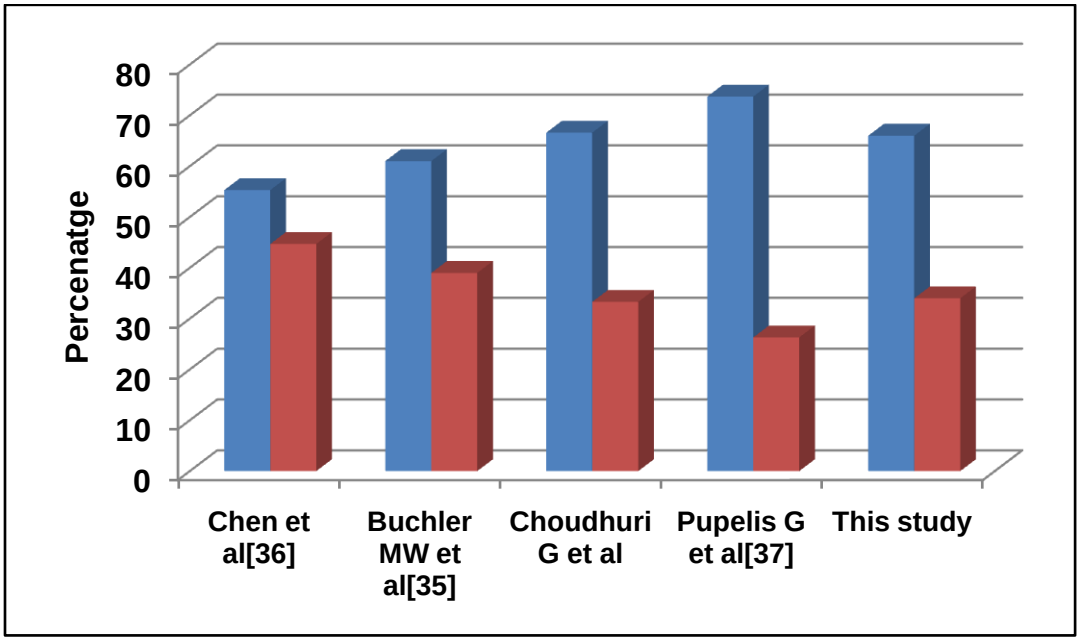


**Figure 16 - Comparison of gender wise distribution with other studies**

**ETIOLOGY –**

Gall stone (52.0%) is most common cause of acute pancreatitis in our study. Second most common cause is alcohol with 22.0% cases. Gall stone is also most common cause in study by Buchler MW et al (45%) and Chen et al (66%).

**Table 32 - Comparison of distribution of acute pancreatitis on the basis of etiology with other studies**

| Study | Gallstones | Alcohol | Idiopathic |
|---|---|---|---|
| Buchler MW et al | 45 | 33 | 22 |
| Chen et al | 66 | 6.8 | 16.1 |
| Pupelis G et al | 19 | 54 | 27 |
| Choudhuri G et al | 26 | 45 | 19 |
| This study | 52 | 22 | 16 |

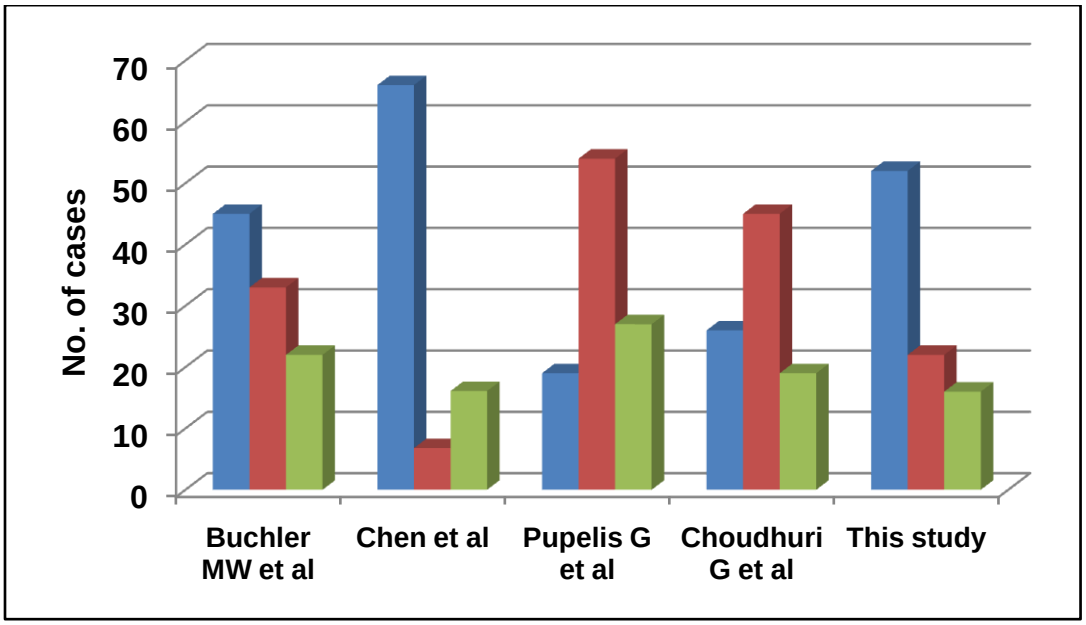


**Figure 17 - Comparison of distribution of acute pancreatitis on the basis of etiology with other studies**

**DISTRIBUTION ON THE BASIS OF BISAP SCORE –**

In our study, there are 58.0% cases at < 3 score and 42.0% cases at ≥ 3 score. It is comparable to study by Buchler MW et al (58.0% at < 3 and 42.0% at ≥ 3) and Kashid A et al[39] (52.73% at <3 and 47.27 at ≥ 3).

**Table 33 - Comparison of distribution on the basis of BISAP Score with other studies**

| Study | < 3 cases (%) | ≥ 3 cases (%) |
|---|---|---|
| Choudhuri G et al | 47.27 | 52.3 |
| Kashid A et al[39] | 52.73 | 47.27 |
| Buchler MW et al | 58 | 42 |
| Chen et al | 79.6 | 20.4 |
| This study | 58 | 42 |

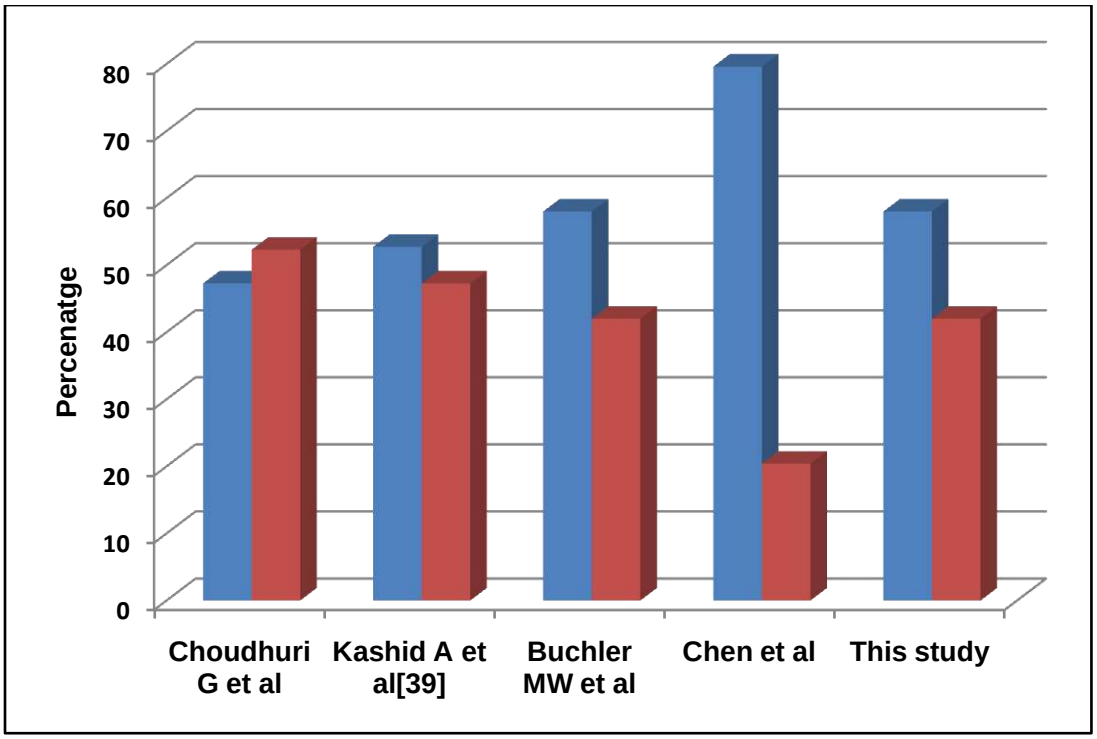


**Figure 18 - Comparison of distribution on the basis of BISAP Score with other studies**

**PANCREATIC NECROSIS IN ACUTE PANCREATITIS –**

In our study, pancreatic necrosis present in 12 (24.0%) cases. Incidence of pancreatic necrosis rises at score ≥ 3 (significant p-value - 0.008). It is comparable to study by Khanna et al (23.6%) and Chen et al (25.7%).

**Table 34 - Comparison of pancreatic necrosis with other studies**

| Study | Pancreatic necrosis (%) |
|---|---|
| Park JY et al[40] | 13.2 |
| Khanna et al[41] | 23.6 |
| Chen et al[36] | 25.7 |
| This study | 24.0 |

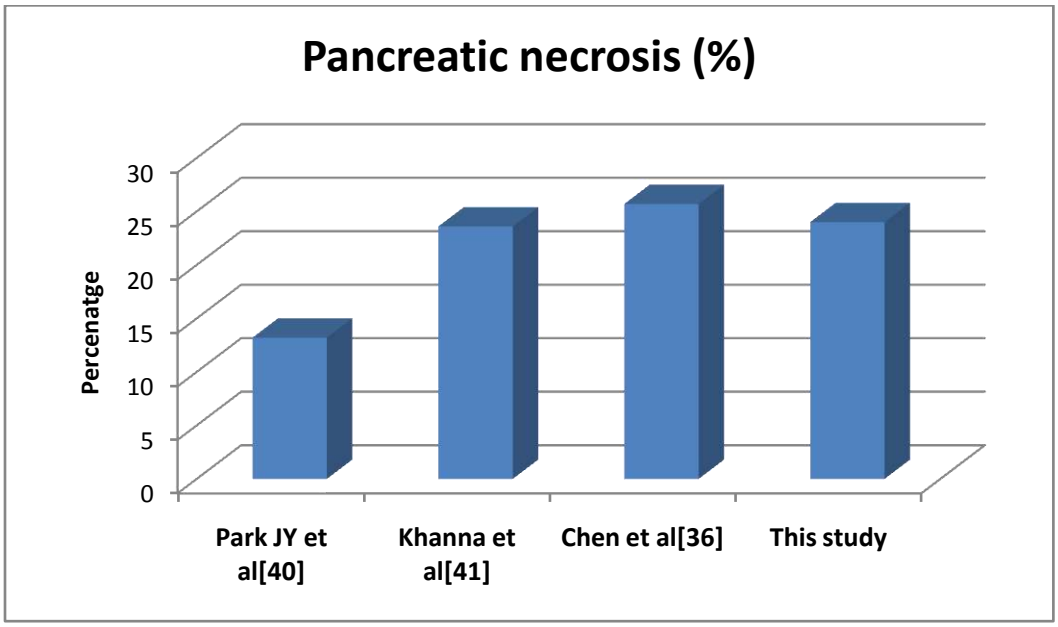


**Figure 19 - Comparison of pancreatic necrosis with other studies**

**ORGAN FAILURE –**

In our study, 46% patient had organ failure. At score ≥ 3, there is increase risk of organ failure and it is statistically significant (p-value – 0.00). It is comparable to study by Khanna et al[41] and Maheshwari N et al.[42]

**Table 35 - Comparison of organ failure in acute pancreatitis with other studies**

| Study | Organ failure (%) |
|---|---|
| Singh VK et al[15] | 18.0 |
| Chen et al[36] | 28.7 |
| Khanna et al[41] | 43.0 |
| Maheshwari N et al[42] | 50.7 |
| Zhu AJ et al[43] | 63.5 |
| This study | 46.0 |

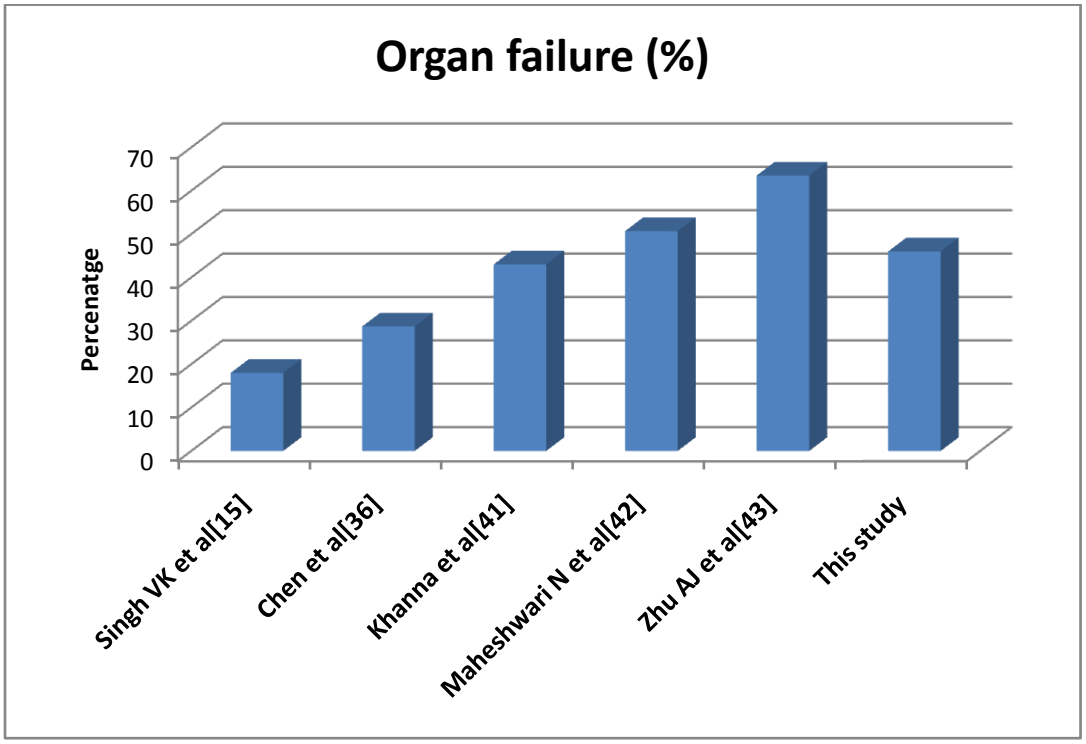


**Figure 20 - Comparison of organ failure in acute pancreatitis with other studies**

# SUMMARY AND CONCLUSION

The most remarkable feature of BISAP score is that it is easy and quick to calculate. It needs vital signs, general and abdominal examination, laboratory values and radiology to detect presence of pleural effusion that is routine workup for any acute abdomen. We compared prognosis according to BISAP Score with Revised Atlanta classification, 2012.

In our study, patient's mean age of presentation increases with increasing BISAP score with significant p-value (0.016). All cases presented with pain abdomen with or without pain radiation to back. Tenderness on abdominal palpation present in 27 (54.0%) patients while guarding / rigidity present in 6 (12.0%) cases. The leading cause of acute pancreatitis in our study is gall stones, with maximum 26 (52.0%) cases. Second most common cause is alcohol with 11 (22.0%) cases. SIRS is the most common component of BISAP score, present in 47 (94.0%) cases.

Pancreatic necrosis present in 12 (24.0%) cases. Incidence of pancreatic necrosis rises at score ≥ 3 which is statistically significant (p-value- 0.008). There is one case having mortality present in this study, at BISAP score of 4.

In our study, transient organ failure present in 14 (28.0%) cases, persistent organ failures present in 9 (28.0%) cases and 27 (54.0%) cases have no organ failure. It is concluded that at score ≥ 3, there is increased risk of organ failure and it is statistically significant (p-value – 0.00). There are 22 (44.0%) cases of respiratory, 3 (6.0%) cases of renal and 2 (4.0%) cases of cardiovascular organ failure.

There are 27 (54.0%) mild, 14 (28.0%) moderately severe and 9 (18.0%) severe cases of acute pancreatitis. It is concluded that at score ≥ 3, there is increased risk of moderately severe and severe pancreatitis and it is statistically significant (p-value – 0.00).

We conclude that BISAP score ≥ 3 is significantly predictive of organ failure, pancreatic necrosis and moderately severe / severe acute pancreatitis. It is an accurate means of risk stratification and prognostic

prediction. It helps us to improve early risk stratification and do appropriate interventions in patients having severe pancreatitis.

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| S.NO | NAME | MRD | AGE | SEX | DATE OF ADMISSION | DATE OF DISCHARGE / DEATH | CHIEF COMPLAINTS | | | | PERSONAL HISTORY | | | BLOOD PRESSURE (mmHg) | PULSE RATE (/min) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PAIN ABDOMEN | VOMITTING | FEVER | BREATHLESSNESS | ALCOHOL | SMOKING | DRUG ABUSE | | |
| 1 | CP | 724739 | 67 | FEMALE | 5/9/2019 | 5/16/2019 | YES | NO | YES | NO | NO | NO | NO | 100/70 | 99 |
| 2 | MJ | 727967 | 40 | MALE | 5/14/2019 | 5/18/2019 | YES | YES | NO | NO | NO | NO | NO | 124/70 | 110 |
| 3 | KS | 755273 | 48 | MALE | 6/26/2019 | 7/8/2019 | YES | YES | NO | NO | YES | NO | NO | 110/70 | 92 |
| 4 | G | 209262 | 26 | MALE | 6/28/2019 | 7/6/2019 | YES | NO | NO | NO | NO | NO | NO | 110/66 | 86 |
| 5 | SK | 758002 | 42 | FEMALE | 6/29/2019 | 7/16/2019 | YES | YES | NO | NO | NO | NO | NO | 110/70 | 94 |
| 6 | JS | 762621 | 70 | MALE | 7/7/2019 | 7/25/2019 | YES | NO | NO | YES | NO | NO | YES | 120/80 | 88 |
| 7 | V | 771941 | 17 | MALE | 7/22/2019 | 8/5/2019 | YES | YES | YES | NO | NO | NO | NO | 100/60 | 106 |
| 8 | CB | 775796 | 40 | MALE | 7/26/2019 | 9/6/2019 | YES | NO | NO | NO | YES | NO | NO | 110/70 | 86 |
| 9 | SA | 779092 | 21 | MALE | 7/31/2019 | 8/9/2019 | YES | NO | NO | NO | NO | NO | YES | 114/70 | 90 |
| 10 | BS | 782250 | 38 | MALE | 8/5/2019 | 8/23/2019 | YES | NO | NO | NO | YES | NO | NO | 110/70 | 92 |
| 11 | AG | 795278 | 24 | MALE | 8/26/2019 | 9/20/2019 | YES | NO | NO | YES | YES | NO | NO | 120/70 | 90 |
| 12 | SC | 547936 | 42 | MALE | 8/31/2019 | 9/6/2019 | YES | NO | NO | NO | NO | NO | NO | 100/60 | 90 |
| 13 | TS | 800392 | 76 | MALE | 9/1/2019 | 9/14/2019 | YES | NO | NO | NO | NO | NO | NO | 150/90 | 86 |
| 14 | KK | 803049 | 54 | MALE | 9/5/2019 | 9/12/2019 | YES | YES | NO | NO | NO | NO | NO | 120/70 | 84 |
| 15 | PB | 809305 | 60 | MALE | 9/13/2019 | 9/18/2019 | YES | NO | NO | NO | NO | NO | NO | 110/70 | 90 |
| 16 | AC | 812284 | 45 | MALE | 9/17/2019 | 9/27/2019 | YES | YES | NO | NO | YES | NO | NO | 120/72 | 100 |
| 17 | DS | 402152 | 56 | MALE | 9/17/2019 | 9/21/2019 | YES | NO | NO | NO | YES | NO | NO | 108/70 | 80 |
| 18 | NL | 816596 | 37 | MALE | 9/24/2019 | 10/5/2019 | YES | NO | NO | NO | NO | NO | NO | 122/76 | 84 |
| 19 | VS | 822179 | 37 | MALE | 10/2/2019 | 10/9/2019 | YES | YES | NO | NO | YES | NO | NO | 112/70 | 84 |
| 20 | MS | 822079 | 58 | FEMALE | 10/2/2019 | 10/7/2019 | YES | YES | NO | NO | NO | NO | NO | 110/72 | 100 |
| 21 | ML | 327577 | 62 | MALE | 10/20/2019 | 11/12/2019 | YES | YES | NO | NO | NO | NO | NO | 140/90 | 94 |
| 22 | MS | 834948 | 53 | MALE | 10/23/2019 | 10/30/2019 | YES | NO | NO | NO | NO | NO | NO | 110/76 | 84 |
| 23 | HS | 811496 | 18 | MALE | 11/3/2019 | 11/7/2019 | YES | NO | NO | NO | NO | NO | NO | 120/74 | 90 |
| 24 | KK | 845873 | 27 | MALE | 11/9/2019 | 11/12/2019 | YES | NO | NO | NO | NO | NO | NO | 106/70 | 86 |
| 25 | GS | 846481 | 44 | MALE | 11//9/2019 | 11/16/2019 | YES | NO | NO | NO | YES | NO | NO | 110/68 | 80 |
| 26 | SK | 848006 | 36 | FEMALE | 11/12/2019 | 11/27/2019 | YES | NO | NO | NO | NO | NO | NO | 120/70 | 84 |
| 27 | MS | 849469 | 19 | FEMALE | 11/14/2019 | 12/7/2020 | YES | NO | NO | NO | NO | NO | NO | 100/60 | 110 |
| 28 | NJ | 857626 | 36 | FEMALE | 11/28/2019 | 12/9/2020 | YES | NO | NO | NO | NO | NO | NO | 130/90 | 110 |
| 29 | LS | 858630 | 34 | MALE | 11/29/2019 | 11/30/2019 | YES | NO | NO | YES | YES | NO | NO | 60 | 126 |
| 30 | AS | 863635 | 62 | MALE | 12/8/2019 | 12/19/2019 | YES | NO | NO | NO | YES | NO | NO | 100/68 | 100 |
| 31 | SD | 876617 | 21 | FEMALE | 1/5/2020 | 1/17/2020 | YES | YES | NO | NO | NO | NO | NO | 94/60 | 110 |
| 32 | VB | 883782 | 38 | MALE | 1/20/2020 | 2/11/2020 | YES | NO | NO | NO | NO | NO | NO | 110/68 | 106 |
| 33 | AS | 887494 | 36 | MALE | 1/27/2020 | 2/7/2020 | YES | NO | NO | NO | NO | NO | NO | 110/70 | 108 |
| 34 | RK | 888770 | 55 | FEMALE | 1/28/2020 | 2/4/2020 | YES | NO | NO | NO | NO | NO | NO | 90/60 | 100 |
| 35 | RR | 888794 | 35 | FEMALE | 1/28/2020 | 2/6/2020 | YES | NO | NO | YES | NO | NO | NO | 100/60 | 160 |
| 36 | GM | 889346 | 33 | MALE | 1/29/2020 | 2/8/2020 | YES | NO | NO | NO | YES | YES | NO | 120/70 | 106 |
| 37 | RK | 890575 | 60 | MALE | 1/31/2020 | 2/16/2020 | YES | YES | NO | NO | YES | NO | NO | 110/70 | 110 |
| 38 | SK | 890018 | 26 | MALE | 1/31/2020 | 2/14/2020 | YES | NO | NO | NO | YES | NO | NO | 132/82 | 102 |
| 39 | RD | 891138 | 36 | FEMALE | 2/1/2020 | 2/4/2020 | YES | NO | NO | NO | NO | NO | NO | 110/70 | 90 |
| 40 | JS | 893388 | 70 | MALE | 2/5/2020 | 2/29/2020 | YES | NO | NO | NO | YES | NO | NO | 112/60 | 86 |
| 41 | RK | 894145 | 38 | FEMALE | 2/7/2020 | 2/22/2020 | YES | NO | NO | NO | NO | NO | NO | 150/100 | 90 |
| 42 | PC | 894778 | 30 | FEMALE | 2/7/2020 | 2/20/2020 | YES | YES | NO | NO | NO | NO | NO | 130/80 | 60 |
| 43 | MS | 895682 | 28 | FEMALE | 2/9/2020 | 3/21/2020 | YES | YES | NO | NO | NO | NO | NO | 120/78 | 74 |
| 44 | AD | 611484 | 41 | MALE | 2/10/2020 | 2/18/2020 | YES | NO | NO | NO | NO | NO | NO | 110/60 | 94 |
| 45 | GK | 898533 | 49 | FEMALE | 2/13/2020 | 2/19/2020 | YES | YES | NO | NO | NO | NO | NO | 110/70 | 90 |
| 46 | DM | 899150 | 58 | FEMALE | 2/14/2020 | 2/21/2020 | YES | NO | NO | NO | NO | NO | NO | 130/90 | 90 |
| 47 | VK | 899859 | 30 | MALE | 2/15/2020 | 2/25/2020 | YES | YES | NO | NO | NO | NO | NO | 120/74 | 100 |
| 48 | JK | 907967 | 70 | FEMALE | 2/29/2020 | 3/10/2020 | YES | YES | NO | NO | NO | NO | NO | 104/70 | 92 |
| 49 | NA | 912904 | 20 | MALE | 3/8/2020 | 3/27/2020 | YES | YES | YES | NO | NO | NO | NO | 120/70 | 84 |
| 50 | LU | 920274 | 27 | FEMALE | 3/24/2020 | 3/27/2020 | YES | NO | NO | NO | NO | NO | NO | 114/70 | 86 |

| S.NO | NAME | MRD | RESPIRATORY RATE (/min) | TEMPERATURE (0F) | CNS | ABDOMEN | | PLEURAL EFFUSION | USG ABDOMEN | PANCREATIC NECROSIS CT/MRI | S. AMYLASE (U/L) | S. LIPASE (U/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TENDER | GUARDING/RIGIDITY | | | | | |
| 1 | CP | 724739 | 20 | 100 | ORIENTED | NO | NO | NO | ACUTE PANCREATITIS | NO | 534 | 366 |
| 2 | MJ | 727967 | 22 | 98.6 | ORIENTED | NO | NO | NO | | NO | 1478 | 3015 |
| 3 | KS | 755273 | 22 | 99 | ORIENTED | YES | NO | YES | | NO | 290 | 369 |
| 4 | G | 209262 | 24 | 99.4 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | NO | 2117 | 4848 |
| 5 | SK | 758002 | 24 | 99.5 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | NO | 253 | 482 |
| 6 | JS | 762621 | 22 | 99 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | NO | 670 | 913 |
| 7 | V | 771941 | 22 | 99.5 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | NO | 180 | 240 |
| 8 | CB | 775796 | 22 | 99.2 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | YES | 1223 | 1964 |
| 9 | SA | 779092 | 24 | 98.7 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | NO | 1345 | 874 |
| 10 | BS | 782250 | 22 | 97.5 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | NO | 171 | 77 |
| 11 | AG | 795278 | 22 | 96.4 | ORIENTED | NO | NO | YES | | YES | 301 | 651 |
| 12 | SC | 547936 | 22 | 99.2 | ORIENTED | NO | NO | NO | | NO | 210 | 183 |
| 13 | TS | 800392 | 22 | 96.8 | ORIENTED | NO | NO | YES | | NO | 241 | 177 |
| 14 | KK | 803049 | 20 | 98.8 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | YES | 208 | 127 |
| 15 | PB | 809305 | 22 | 98.6 | ORIENTED | NO | NO | YES | | NO | 247 | 555 |
| 16 | AC | 812284 | 24 | 98.2 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | NO | 327 | 1005 |
| 17 | DS | 402152 | 20 | 96.2 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | NO | 181 | 180 |
| 18 | NL | 816596 | 24 | 98 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | NO | 524 | 1041 |
| 19 | VS | 822179 | 24 | 96.8 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | NO | 206 | 250 |
| 20 | MS | 822079 | 24 | 98.8 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | NO | 804 | 1044 |
| 21 | ML | 327577 | 24 | 99.1 | ORIENTED | NO | NO | NO | ACUTE PANCREATITIS | YES | 2113 | 2911 |
| 22 | MS | 834948 | 22 | 98 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | NO | 1793 | 2301 |
| 23 | HS | 811496 | 24 | 99.6 | ORIENTED | NO | NO | NO | | NO | 204 | 559 |
| 24 | KK | 845873 | 26 | 97 | ORIENTED | NO | NO | NO | ACUTE PANCREATITIS | NO | 755 | 2113 |
| 25 | GS | 846481 | 24 | 97.1 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | NO | 882 | 1331 |
| 26 | SK | 848006 | 22 | 99 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | YES | 2308 | 2691 |
| 27 | MS | 849469 | 26 | 101 | DROWSY | YES | NO | NO | | YES | 564 | 433 |
| 28 | NJ | 857626 | 24 | 99.4 | ORIENTED | YES | YES | NO | ACUTE PANCREATITIS | NO | 2187 | 1981 |
| 29 | LS | 858630 | 26 | 101 | DROWSY | YES | YES | YES | | NO | 4941 | 6345 |
| 30 | AS | 863635 | 22 | 96.6 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | YES | 46 | 82 |
| 31 | SD | 876617 | 24 | 99.6 | ORIENTED | NO | NO | NO | ACUTE PANCREATITIS | NO | 264 | 230 |
| 32 | VB | 883782 | 20 | 98.6 | ORIENTED | YES | NO | NO | | NO | 1965 | 5089 |
| 33 | AS | 887494 | 24 | 100.6 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | YES | 92 | 95 |
| 34 | RK | 888770 | 24 | 100 | ORIENTED | NO | NO | NO | ACUTE PANCREATITIS | NO | 342 | 262 |
| 35 | RR | 888794 | 26 | 99.2 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | YES | 68 | 82 |
| 36 | GM | 889346 | 24 | 98.6 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | YES | 37 | 35 |
| 37 | RK | 890575 | 24 | 96 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | YES | 1212 | 981 |
| 38 | SK | 890018 | 22 | 99 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | NO | 58 | 319 |
| 39 | RD | 891138 | 24 | 98.2 | ORIENTED | NO | NO | NO | ACUTE PANCREATITIS | NO | 726 | 474 |
| 40 | JS | 893388 | 26 | 99.3 | DROWSY | YES | YES | YES | ACUTE PANCREATITIS | NO | 560 | 468 |
| 41 | RK | 894145 | 20 | 100.2 | DROWSY | YES | NO | NO | ACUTE PANCREATITIS | NO | 87 | 116 |
| 42 | PC | 894778 | 24 | 98.2 | ORIENTED | YES | NO | YES | ACUTE PANCREATITIS | NO | 1467 | 3553 |
| 43 | MS | 895682 | 20 | 99 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | NO | 3060 | 2624 |
| 44 | AD | 611484 | 24 | 97.8 | ORIENTED | YES | YES | YES | ACUTE PANCREATITIS | NO | 132 | 74 |
| 45 | GK | 898533 | 24 | 100.1 | DROWSY | YES | YES | NO | ACUTE PANCREATITIS | NO | 42 | 24 |
| 46 | DM | 899150 | 20 | 98.4 | ORIENTED | YES | NO | NO | | NO | 600 | 640 |
| 47 | VK | 899859 | 22 | 98.2 | ORIENTED | NO | NO | YES | ACUTE PANCREATITIS | NO | 1370 | 763 |
| 48 | JK | 907967 | 18 | 97 | ORIENTED | YES | YES | NO | ACUTE PANCREATITIS | NO | 318 | 440 |
| 49 | NA | 912904 | 20 | 101 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | YES | 145 | 91 |
| 50 | LU | 920274 | 20 | 98.8 | ORIENTED | YES | NO | NO | ACUTE PANCREATITIS | NO | 580 | 360 |

| S.NO | NAME | MRD | B. UREA (mg/dl) | TLC (x 103/uL ) | ON ADMISSION | | | AFTER 48 HOURS | | | ORGAN FAIURE | | | SIRS | MODS | TYPE OF ORGAN FAILURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SYSTOLIC BP | CREATININE | PaO2/ FiO2 | SYSTOLIC BP | CREATININE | PaO2/ FiO2 | RESPIRATORY | RENAL | CARDIOVASCULAR | | | |
| 1 | CP | 724739 | 26 | 2.9 | 100 | 0.75 | 352 | 108 | 0.65 | 419 | NO | NO | NO | YES | NO | NO |
| 2 | MJ | 727967 | 42 | 12.7 | 124 | 1.04 | 352 | 130 | 0.91 | 419 | NO | NO | NO | YES | NO | NO |
| 3 | KS | 755273 | 48 | 9.7 | 110 | 0.79 | 246 | 120 | 0.46 | 306 | YES | NO | NO | YES | NO | TRANSIENT |
| 4 | G | 209262 | 18 | 18.1 | 112 | 0.89 | 447 | 116 | 0.83 | 361 | NO | NO | NO | YES | NO | NO |
| 5 | SK | 758002 | 11 | 23 | 110 | 0.6 | 186 | 110 | 0.84 | 361 | YES | NO | NO | YES | NO | TRANSIENT |
| 6 | JS | 762621 | 100 | 22.1 | 120 | 4.04 | 193 | 110 | 3.07 | 280 | YES | YES | NO | YES | YES | PERSISTENT |
| 7 | V | 771941 | 24 | 14.5 | 88 | 0.7 | 313 | 100 | 0.8 | 373 | NO | NO | YES | YES | NO | TRANSIENT |
| 8 | CB | 775796 | 23 | 13.4 | 110 | 0.92 | 193 | 120 | 0.86 | 395 | YES | NO | NO | YES | NO | TRANSIENT |
| 9 | SA | 779092 | 26 | 13.2 | 114 | 1.1 | 293 | 110 | 0.81 | 306 | YES | NO | NO | YES | NO | TRANSIENT |
| 10 | BS | 782250 | 18 | 11.1 | 110 | 0.91 | 206 | 114 | 0.64 | 306 | YES | NO | NO | YES | NO | TRANSIENT |
| 11 | AG | 795278 | 43 | 12.8 | 120 | 1.18 | 273 | 114 | 1.08 | 233 | YES | NO | NO | YES | NO | PERSISTENT |
| 12 | SC | 547936 | 20 | 8.3 | 110 | 1.08 | 391 | 114 | 0.8 | 408 | NO | NO | NO | NO | NO | NO |
| 13 | TS | 800392 | 33 | 10.6 | 150 | 1.27 | 293 | 140 | 1.07 | 273 | YES | NO | NO | YES | NO | PERSISTENT |
| 14 | KK | 803049 | 34 | 15.5 | 120 | 0.97 | 273 | 124 | 0.68 | 391 | YES | NO | NO | YES | NO | TRANSIENT |
| 15 | PB | 809305 | 23 | 12.4 | 114 | 0.74 | 382 | 114 | 0.74 | 356 | NO | NO | NO | YES | NO | NO |
| 16 | AC | 812284 | 21 | 9.1 | 116 | 0.39 | 408 | 106 | 0.31 | 426 | NO | NO | NO | YES | NO | NO |
| 17 | DS | 402152 | 33 | 17.4 | 106 | 1.01 | 400 | 114 | 0.81 | 391 | NO | NO | NO | NO | NO | NO |
| 18 | NL | 816596 | 17 | 7.1 | 122 | 0.77 | 391 | 108 | 0.87 | 408 | NO | NO | NO | YES | NO | NO |
| 19 | VS | 822179 | 31 | 11 | 122 | 0.77 | 300 | 110 | 0.62 | 408 | YES | NO | NO | YES | NO | TRANSIENT |
| 20 | MS | 822079 | 19 | 14.5 | 108 | 0.6 | 417 | 110 | 0.7 | 391 | NO | NO | NO | YES | NO | NO |
| 21 | ML | 327577 | 45 | 20.3 | 140 | 1.1 | 230 | 130 | 1.1 | 195 | YES | NO | NO | YES | NO | PERSISTENT |
| 22 | MS | 834948 | 33 | 12.4 | 110 | 0.85 | 426 | 110 | 0.59 | 391 | NO | NO | NO | YES | NO | NO |
| 23 | HS | 811496 | 13 | 4.7 | 110 | 0.76 | 466 | 106 | 0.76 | 447 | NO | NO | NO | YES | NO | NO |
| 24 | KK | 845873 | 27 | 12.4 | 110 | 0.75 | 428 | 108 | 0.75 | 400 | NO | NO | NO | YES | NO | NO |
| 25 | GS | 846481 | 21 | 16.8 | 108 | 0.8 | 438 | 114 | 0.9 | 438 | NO | NO | NO | YES | NO | NO |
| 26 | SK | 848006 | 23 | 19 | 110 | 0.55 | 438 | 116 | 0.24 | 419 | NO | NO | NO | YES | NO | NO |
| 27 | MS | 849469 | 12 | 11.4 | 100 | 0.37 | 260 | 110 | 0.36 | 306 | YES | NO | NO | YES | NO | TRANSIENT |
| 28 | NJ | 857626 | 70 | 6.9 | 130 | 1.24 | 330 | 126 | 0.51 | 438 | NO | NO | NO | YES | NO | NO |
| 29 | LS | 858630 | 88 | 19.9 | 80 | 3.5 | 180 | 84 | 4.2 | 165 | YES | YES | YES | YES | YES | PERSISTENT |
| 30 | AS | 863635 | 17 | 12.2 | 110 | 0.97 | 260 | 104 | 0.66 | 213 | YES | NO | NO | YES | NO | PERSISTENT |
| 31 | SD | 876617 | 15 | 20.2 | 94 | 0.42 | 306 | 100 | 0.3 | 330 | NO | NO | NO | YES | NO | NO |
| 32 | VB | 883782 | 8 | 12.8 | 110 | 0.74 | 461 | 120 | 0.6 | 447 | NO | NO | NO | YES | NO | NO |
| 33 | AS | 887494 | 26 | 18.7 | 110 | 0.87 | 246 | 100 | 0.78 | 313 | YES | NO | NO | YES | NO | TRANSIENT |
| 34 | RK | 888770 | 40 | 24.3 | 90 | 0.44 | 540 | 130 | 0.55 | 310 | NO | NO | NO | YES | NO | NO |
| 35 | RR | 888794 | 61 | 23.7 | 100 | 1.54 | 360 | 120 | 1.06 | 260 | YES | NO | NO | YES | NO | TRANSIENT |
| 36 | GM | 889346 | 19 | 21.8 | 104 | 0.84 | 306 | 110 | 0.79 | 426 | NO | NO | NO | YES | NO | NO |
| 37 | RK | 890575 | 27 | 8.1 | 110 | 0.69 | 270 | 114 | 0.66 | 180 | YES | NO | NO | YES | NO | PERSISTENT |
| 38 | SK | 890018 | 34 | 13.5 | 132 | 0.99 | 260 | 140 | 0.38 | 386 | YES | NO | NO | YES | NO | TRANSIENT |
| 39 | RD | 891138 | 31 | 8.7 | 110 | 0.56 | 408 | 110 | 0.69 | 443 | NO | NO | NO | YES | NO | NO |
| 40 | JS | 893388 | 105 | 15.5 | 100 | 4.3 | 295 | 100 | 7.1 | 270 | YES | YES | NO | YES | YES | PERSISTENT |
| 41 | RK | 894145 | 24 | 21 | 110 | 0.57 | 223 | 120 | 0.48 | 273 | YES | NO | NO | YES | NO | PERSISTENT |
| 42 | PC | 894778 | 14 | 6.4 | 130 | 0.56 | 443 | 120 | 0.56 | 408 | NO | NO | NO | NO | NO | NO |
| 43 | MS | 895682 | 16 | 17.3 | 100 | 0.46 | 391 | 110 | 0.39 | 382 | NO | NO | NO | YES | NO | NO |
| 44 | AD | 611484 | 15 | 14.8 | 110 | 0.79 | 382 | 114 | 0.84 | 312 | NO | NO | NO | YES | NO | NO |
| 45 | GK | 898533 | 20 | 10.2 | 110 | 0.76 | 373 | 114 | 0.81 | 400 | NO | NO | NO | YES | NO | NO |
| 46 | DM | 899150 | 44 | 14.2 | 130 | 0.65 | 369 | 126 | 0.51 | 339 | NO | NO | NO | YES | NO | NO |
| 47 | VK | 899859 | 17 | 15.7 | 120 | 0.64 | 361 | 114 | 0.56 | 419 | NO | NO | NO | YES | NO | NO |
| 48 | JK | 907967 | 29 | 13.9 | 104 | 0.77 | 233 | 110 | 0.62 | 400 | YES | NO | NO | YES | NO | TRANSIENT |
| 49 | NA | 912904 | 34 | 14.1 | 110 | 0.84 | 246 | 114 | 0.61 | 313 | YES | NO | NO | YES | NO | TRANSIENT |
| 50 | LU | 920274 | 23 | 10.1 | 114 | 0.81 | 461 | 110 | 0.75 | 447 | NO | NO | NO | YES | NO | NO |

| S.NO | NAME | MRD | CAUSE OF ACUTE PANCREATITIS | BISAP SCORE | TYPE OF ACUTE PANCREATITIS | DURATION OF HOSPITAL STAY | SURGICAL INTERVENTION | OUTCOME |
|---|---|---|---|---|---|---|---|---|
| 1 | CP | 724739 | BILIARY | 3 | MILD | 8 | YES (ERCP) | DISCHARGE |
| 2 | MJ | 727967 | IDIOPATHIC | 2 | MILD | 5 | NO | DISCHARGE |
| 3 | KS | 755273 | ALCOHOL | 3 | MODERATELY SEVERE | 13 | NO | DISCHARGE |
| 4 | G | 209262 | BILIARY | 1 | MILD | 9 | NO | DISCHARGE |
| 5 | SK | 758002 | BILIARY | 2 | MODERATELY SEVERE | 18 | NO | DISCHARGE |
| 6 | JS | 762621 | DRUG | 5 | SEVERE | 19 | YES (NASOCYTIC DRAINAGE) | DISCHARGE |
| 7 | V | 771941 | BILIARY | 2 | MODERATELY SEVERE | 15 | NO | DISCHARGE |
| 8 | CB | 775796 | ALCOHOL | 2 | MODERATELY SEVERE | 45 | YES (PCD) | DISCHARGE |
| 9 | SA | 779092 | DRUG | 3 | MODERATELY SEVERE | 10 | NO | DISCHARGE |
| 10 | BS | 782250 | ALCOHOL | 2 | MODERATELY SEVERE | 19 | NO | DISCHARGE |
| 11 | AG | 795278 | ALCOHOL | 3 | SEVERE | 26 | YES (PCD) | DISCHARGE |
| 12 | SC | 547936 | IDIOPATHIC | 1 | MILD | 7 | NO | DISCHARGE |
| 13 | TS | 800392 | IDIOPATHIC | 4 | SEVERE | 14 | NO | DISCHARGE |
| 14 | KK | 803049 | BILIARY | 3 | MODERATELY SEVERE | 8 | NO | DISCHARGE |
| 15 | PB | 809305 | IDIOPATHIC | 2 | MILD | 6 | NO | DISCHARGE |
| 16 | AC | 812284 | ALCOHOL | 1 | MILD | 11 | NO | DISCHARGE |
| 17 | DS | 402152 | ALCOHOL | 2 | MILD | 5 | NO | DISCHARGE |
| 18 | NL | 816596 | HYPERCALCEMIA | 1 | MILD | 12 | NO | DISCHARGE |
| 19 | VS | 822179 | BILIARY | 3 | MODERATELY SEVERE | 8 | NO | DISCHARGE |
| 20 | MS | 822079 | BILIARY | 1 | MILD | 6 | NO | DISCHARGE |
| 21 | ML | 327577 | BILIARY | 4 | SEVERE | 24 | YES (PCD) | DISCHARGE |
| 22 | MS | 834948 | BILIARY | 3 | MILD | 8 | NO | DISCHARGE |
| 23 | HS | 811496 | BILIARY | 1 | MILD | 5 | YES (ERCP) | DISCHARGE |
| 24 | KK | 845873 | AUTOIMMUNE | 2 | MILD | 4 | NO | DISCHARGE |
| 25 | GS | 846481 | ALCOHOL | 1 | MILD | 8 | NO | DISCHARGE |
| 26 | SK | 848006 | BILIARY | 2 | MILD | 16 | NO | DISCHARGE |
| 27 | MS | 849469 | BILIARY | 3 | MODERATELY SEVERE | 24 | NO | DISCHARGE |
| 28 | NJ | 857626 | IDIOPATHIC | 2 | MILD | 12 | NO | DISCHARGE |
| 29 | LS | 858630 | ALCOHOL | 4 | SEVERE | 2 | NO | DEATH |
| 30 | AS | 863635 | BILIARY | 3 | SEVERE | 11 | NO | DISCHARGE |
| 31 | SD | 876617 | BILIARY | 1 | MILD | 13 | NO | DISCHARGE |
| 32 | VB | 883782 | BILIARY | 1 | MILD | 22 | NO | DISCHARGE |
| 33 | AS | 887494 | BILIARY | 3 | MODERATELY SEVERE | 12 | NO | DISCHARGE |
| 34 | RK | 888770 | BILIARY | 2 | MILD | 8 | NO | DISCHARGE |
| 35 | RR | 888794 | BILIARY | 4 | MODERATELY SEVERE | 10 | NO | DISCHARGE |
| 36 | GM | 889346 | ALCOHOL | 2 | MILD | 11 | NO | DISCHARGE |
| 37 | RK | 890575 | ALCOHOL | 4 | SEVERE | 17 | NO | DISCHARGE |
| 38 | SK | 890018 | TRAUMA | 3 | MODERATELY SEVERE | 15 | NO | DOR |
| 39 | RD | 891138 | BILIARY | 2 | MILD | 4 | YES (CHOLECYSTECTOMY) | DISCHARGE |
| 40 | JS | 893388 | ALCOHOL | 5 | SEVERE | 25 | NO | DISCHARGE |
| 41 | RK | 894145 | IDIOPATHIC | 3 | SEVERE | 16 | NO | DISCHARGE |
| 42 | PC | 894778 | BILIARY | 1 | MILD | 13 | NO | DISCHARGE |
| 43 | MS | 895682 | BILIARY | 2 | MILD | 13 | NO | DISCHARGE |
| 44 | AD | 611484 | BILIARY | 2 | MILD | 9 | NO | DISCHARGE |
| 45 | GK | 898533 | BILIARY | 2 | MILD | 7 | YES(ERCP) | DISCHARGE |
| 46 | DM | 899150 | BILIARY | 2 | MILD | 8 | YES(CHOLECYTECTOMY) | DISCHARGE |
| 47 | VK | 899859 | IDIOPATHIC | 2 | MILD | 11 | NO | DISCHARGE |
| 48 | JK | 907967 | BILIARY | 3 | MODERATELY SEVERE | 11 | YES (CHOLECYSTECTOMY) | DISCHARGE |
| 49 | NA | 912904 | BILIARY | 3 | MODERATELY SEVERE | 20 | NO | DISCHARGE |
| 50 | LU | 920274 | IDIOPATHIC | 1 | MILD | 4 | NO | DISCHARGE |

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No. BFUHS/2K19p-TH/ 1043

Date 9/9/19

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.05.2019 has approved the plan of thesis of **Anurag Tomer**, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

**A prospective study to evaluate bisap score in predicting morbidity and mortality in acute pancreatitis**

Supervisor
Dr. Ravinder Pal Singh
Prof.,
Dept. of Surgery,
DMCH, Ludhiana.

Co-Supervisor
Dr. Atul Mishra
Prof.,
Dept. of Surgery,
DMCH, Ludhiana.

The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,( if any).

SPSingh

Dr. S P Singh MS(Oph)
Controller of Examinations

*Note :*

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

# A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS

## THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

M.S

In

General Surgery

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

NOVEMBER, 2018

DR. ANURAG TOMER

DEPARTMENT OF GENERAL SURGERY
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

# ABSTRACT OF PLAN OF THESIS

| | |
|---|---|
| Title | **A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS** |
| For the degree of | M.S. General Surgery |
| Name of the candidate | Dr. Anurag Tomer |
| Supervisor | Dr. Ravinder Pal Singh, Professor, Department of General Surgery , DMC&H, Ludhiana |
| Co-supervisor | Dr. Atul Mishra, Professor, Department of General Surgery , DMC&H Ludhiana |
| Institution | Dayanand Medical College & Hospital, Ludhiana |
| University | Baba Farid University of Health Sciences, Faridkot |

**Introduction:** Acute pancreatitis is an acute inflammation of the pancreas often causing damage to various organs. An early and accurate risk stratification of patients would help in early initiation of therapy for patients with severe acute pancreatitis. The Bedside Index for Severity in Acute Pancreatitis (BISAP) score given as the number of criteria present of the following five: blood urea nitrogen >25 mg/dL, impaired mental status, presence of SIRS, age >60 years, and presence of pleural effusion (SIRS would be present if 2 or more of the 4 criteria were present including temperature of >38°C (100.4°F) or <36°C (96.8°F); pulse rate of >90 beats/min; tachypnea (respiratory rate >20 breaths/min or PaCO2<32mmHg) or deranged white blood cell count (>12,000/μL or <4,000/μL).

**Aim of Study:** To evaluate the BISAP score to predict severity of Acute Pancreatitis.

**Materials & Methods**: This prospective study will be conducted on 50 consecutive patients diagnosed as acute pancreatitis admitted in emergency department of DMC&H. BISAP score will be calculated based on data obtained within 24 hours of hospitalization. Severity of AP will be defined according to the Revised Atlanta Classification, 2012. Organ failure will be defined using the Modified Marshall scoring system.

**Clinical Significance:** BISAP score can be calculated within first 24 hours of presentation which is the most crucial time window in management of pancreatitis. An early and reliable clinical scoring method can dramatically improve the management of acute pancreatitis.

**Keywords:** Acute pancreatitis, BISAP.

Anurag Tomer
(Signature)
Candidate

(Signature)
Co-supervisor

Ravinder
(Signature)
Supervisor

(Signature)
Principal

## CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS"** exist in the Department of General Surgery, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself under our supervision and guidance.

**Supervisor**

**Dr. Ravinder Pal Singh**
Professor
Department of General Surgery
DMCH, Ludhiana

**Co-Supervisor**

**Dr. Atul Mishra**
Professor
Department of General Surgery
DMCH, Ludhiana

**Dr. Jaspal Singh**
Professor & Head
Department of General Surgery
DMCH, Ludhiana

Place: DMC Ludhiana

Date: 7/12/18

# APPROVAL PROFORMA
# BY
# RESEARCH & ETHICAL COMMITTEE
# DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

| | |
|---|---|
| **Name of candidate** | Dr. ANURAG TOMER |
| **Department** | General Surgery |
| **Topic of Thesis** | A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS |
| **Likely date of appearing in PG examination** | MAY 2021 |
| **Date of enrollment** | 10th MAY 2018 |
| **Name of Head of Department** | Dr. Jaspal Singh |
| **1) Supervisor** | Dr. Ravinder Pal Singh |
| **2) Co-Supervisor(s)** | Dr. Atul Mishra |
| **Signature of Members of Research Committee with Stamp** | **Signature of Members of Ethics Committee with Stamp** |
| 1. HOD Pharmacology | 1. HOD Physiology |
| 2. HOD Surgery | 2. HOD Pathology |
| 3. HOD Pathology | 3. HOD Pharmacology |
| 4. HOD Medicine | 4. HOD SPM |
| 5. Dean Academics | 5. HOD Medicine |
| 6. Vice Principal | 6. HOD Surgery |
| | 7. HOD Obst. & Gynae |
| | 8. Legal Expert |
| | 9. Secretary, IEC |
| | 10. Dean Academics |
| | 11. Vice Principal |
| | 12. Principal |

**Approved: Yes / No**

**Chairperson**
**Research Committee**
Chairperson
Research Committee

**Approved: Yes / ~~No~~**

**Chairperson**
**Ethics Committee**
Chairperson
Ethics Committee

# BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

## PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

| | | |
|---|---|---|
| 1 | NAME OF THE CANDIDATE AND ADDRESS | DR. ANURAG TOMER, 3/6131, GOVIND VIHAR, JANTA ROAD, SAHARANPUR, 247001. |
| 2 | NAME OF THE INSTITUTE | DAYANAND MEDICAL COLLEGE AND HOSPITAL, LUDHIANA (PUNJAB) |
| 3 | COURSE OF STUDY AND SUBJECT | M.S. GENERAL SURGERY |
| 4 | DATE OF ADMISSION OF COURSE | 10th MAY, 2018 |
| 5 | TITLE OF THE TOPIC | A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS |

## 6. BRIEF RESUME OF THE INTENDED WORK

### 6.1 NEED FOR THE STUDY

Acute pancreatitis is an acute inflammation of the pancreas often causing damage to various organs. It has variable presentation and has mild to life threatening course. It presents major surgical challenge[1] to general surgeons worldwide.[2] Mostly acute pancreatitis follows mild course and but 20% to 30% of patients develop a severe disease that can lead to systemic inflammation. Severe Acute Pancreatitis is associated with organ failure and local complications like necrosis, infection and pseudocyst formation. An early and accurate risk stratification of patients would help in early initiation of therapy for patients with severe acute pancreatitis to prevent adverse outcomes and thus improve survival of the patient.

The revised 2012 Atlanta classification is a valuable tool to assess acute pancreatitis. It identifies 2 phases of acute pancreatitis - early (First 1 or 2 weeks) and late. Acute pancreatitis can be either edematous interstitial pancreatitis or necrotizing pancreatitis. Severity of the disease is categorized into 3 levels: mild, moderately severe and severe. [3]

A model scoring system should allow an early, quick and reliable risk stratification of the disease severity. Multiple scoring systems are available to evaluate the severity of disease, including Ranson criteria,[4] acute physiology and chronic health evaluation (APACHE) II,[5] and computed tomography severity index (CTSI).[6] However, these scoring systems have own pros and cons. The limitation of the Ranson criteria is that it needs data that require 48 hours of hospitalization, which may lead to missing an early therapeutic window and increased mortality.[7] Also, Ranson criteria is accurate at extreme

of scores (< 3 predicts survival and > 6 predicts death) but not at intermediate scores.[8] While APACHE II has the advantage of allowing determination of disease severity on the day of admission but it requires the collection of number of parameters, some of which may not be relevant to prognosis so complexity is its major drawback.[9,10] CTSI is calculated based on CT findings of some local complications and cannot reflect the systemic inflammatory response.[11,12]

In 2008, Wu et al[13], proposed bedside index for severity in acute pancreatitis (BISAP) scoring system, a prognostic scoring system for early prediction of morbidity and mortality in acute pancreatitis. Data for BISAP score collected within the first 24hr of hospitalization.

**BISAP Score**

1. Blood urea nitrogen > 25mg/dl
2. Impaired mental status (Glasgow coma scale score < 15)
3. Systemic inflammatory response syndrome

   Presence of more than 2 of following criteria

   - Pulse >90 bpm
   - Respiration >20/min or PaCO2 < 32 mm Hg
   - Temperature >38°C (100.4°F) or <36°C (96.8°F)
   - WBC count > 12000 or < 4000 cells/cubic mm or > 10% immature neutrophils

4. Age > 60 yrs
5. Pleural effusion (on chest X ray or USG or CT scan)

Each point on BISAP score is worth 1 point. There is steady increase in risk for mortality with the increasing number of points.

## 6.2 REVIEW OF LITERATURE

An early and reliable clinical scoring method can dramatically improve the management of acute pancreatitis. A risk stratification tool to predict the morbidity and mortality is of great clinical importance.

The earliest scoring system designed to evaluate the severity of acute pancreatitis was introduced by Ranson and colleagues in 1974.[14] It contains data that not routinely collected at the time of hospitalization and require 48 hr to complete, missing a potentially valuable early therapeutic window.

APACHE II was originally developed as an intensive care instrument and requires the collection of a large number of parameters, some of which may not be relevant to prognosis in acute pancreatitis.[9,10]

In 2008, Wu et al[13], proposed BISAP scoring system for prediction of in-hospital mortality in AP. The scoring system was derived from data collected from 17,992 cases of AP from 212 hospitals in 2000-2001. The new scoring system was validated on data collected from 18,256 AP cases from 177 hospitals in 2004-2005. The accuracy of the scoring system for prediction of mortality was measured by the area under the receiver operating characteristic curve (AUC). CART analysis identified five variables for prediction of in-hospital mortality. One point is assigned for the presence of each of the five parameters of BISAP score during the first 24 hour of admission.

Papachristou GI et al[14], compared BISAP score with other scoring systems on 185 patients and confirmed that the BISAP score is an accurate means for risk stratification in patients with AP. Its components are clinically relevant and

easy to obtain. The prognostic accuracy of BISAP is similar to those of the other scoring system.

Vikesh K. Singh et al[15], evaluated BISAP score among 397 consecutive cases of acute pancreatitis admitted to their institution between June 2005 and December 2007. BISAP scores were calculated on all cases using data collected within 24h of presentation. The ability of the BISAP score to predict mortality was evaluated using trend and discrimination analysis. The optimal cutoff score for mortality from the receiver operating curve was used to evaluate the development of organ failure, persistent organ failure, and pancreatic necrosis. Among 397 cases, there were 14 (3.5%) deaths. There was a statistically significant trend for increasing mortality ($p<0.0001$) with increasing BISAP score. The area under the receiver operating curve for mortality by BISAP score in the prospective cohort was 0.82 (95% confidence interval: 0.70, 0.95), which was similar to that of the previously published validation cohort by B U Wu. BISAP score more or equal to 3 was associated with an increased risk of developing organ failure (odds ratio=7.4, 95% confidence interval: 2.8, 19.5), persistent organ failure (odds ratio=12.7, 95% confidence interval: 4.7, 33.9) and pancreatic necrosis (odds ratio=3.8, confidence interval: 1.8, 8.5).

Hariprasad T. R et al[16], found that patients with organ failure and BISAP score more than 3 were found to have prolonged hospital stay. SIRS was the most common component of BISAP scoring system seen in 91.3%. Elderly patients with age more than 60 years (6 pts.) had high BISAP score (5). All patients with shock had BISAP score of >3. A BISAP score of ≥3 was associated with higher morbidity than scores of <3.

Kim B et al[17], compare BISAP with PCT and conclude that the accuracy of BISAP (≥ 2) at predicting severe acute pancreatitis was 84% and was superior to the serum PCT (≥ 3.29 ng/mL, 76%) which was similar to the APACHE-II score. The best cutoff value of BISAP was 2 (AUC, 0.873; 95% confidence interval, 0.770 to 0.976; $p < 0.001$). In logistic regression analysis, BISAP had greater statistical significance than serum PCT.

Kaushik MR et al[18], evaluated that BISAP score computed within 24 hours of admission of 2 or more significantly predicted the severity and complication with P value <0.001. Statistically significant trends of increasing severity and organ failure (P<0.001) with increasing BISAP was observed.

Cho YS et al[19], studied BISAP score on 299 consecutive patients and conclude that there were statistically significant trends for increasing severity ($P < 0.001$) and mortality ($P < 0.001$) with increasing BISAP.

Gompertz et al[20], reviewed the medical records of 128 patients to find usefulness of BISAP score. 18 patients (14%) had local complications, 7 patients (5.4%) developed organ failure and 2 patients died (1.6%). The AUC for BISAP score to detect organ failure was 0.977 (95% CI 0.947-1.000). A BISAP score> 3 had sensitivity, specificity, positive and negative predictive value of 71.4, 99.1, 83.3 and 98.3% respectively. There was a significant correlation between BISAP score and length of hospital stay.

Zhang J. et al[21], compared BISAP score with Ranson and APACHE II, 155 patients were enrolled in the study, 16.7% were classified as having severe AP, and six (3.2%) died. There were statistically significant trends for increasing severity ($P < 0.001$), PNec ($P < 0.001$) and mortality ($P < 0.001$) with increasing BISAP. The AUC for severity predicted by BISAP was 0.793

(95% confidence interval [CI] 0.700-0.886), APACHE II 0.836 (95% CI 0.744-0.928) and by Ranson score was 0.903 (95% CI 0.814-0.992). The AUC for PNec predicted by BISAP was 0.834 (95% CI 0.739-0.929), APACHE II 0.801 (95% CI 0.691-0.910) and by Ranson score was 0.840 (95% CI 0.741-0.939). The AUC for mortality predicted by BISAP was 0.791 (95% CI 0.593-0.989), APACHE II 0.812 (95% CI 0.717-0.906) and by Ranson score was 0.904 (95% CI 0.829-0.979).

## 6.3 AIMS AND OBJECTIVES OF THE STUDY

To evaluate The Bedside Index for Severity in Acute Pancreatitis (BISAP) score to predict Severity of Acute Pancreatitis.

## 7. MATERIALS AND METHODS

### 7.1 SOURCE OF DATA

This prospective study will be conducted on 50 consecutive patients diagnosed as acute pancreatitis and admitted through emergency in Dayanand Medical College & Hospital (DMC&H). BISAP score will calculated based on data obtained within 24 hours of hospitalization. Patients will be followed throughout hospitalization for development of Severe Acute Pancreatitis.

### 7.2 METHOD OF COLLECTION OF DATA

**DIAGNOSIS:**

The diagnosis of acute pancreatitis will be based on the presence of two of the following three criteria:

1) Abdominal pain characteristic of acute pancreatitis.

2) Serum amylase and/or lipase levels at least three times the upper limit of normal.

3) Characteristic findings of acute pancreatitis on abdominal ultrasonography and/or computerized tomography (CT) scan and /or magnetic resonance imaging (MRI).

BISAP score will be calculated in all such patients based on data obtained within 24hrs of hospitalization.

**SEVERITY GRADING OF ACUTE PANCREATITIS:**

Severity of acute pancreatitis will be defined on basis of Revised Atlanta Classification, 2012. It may be classified as mild, moderately severe or severe.

**Mild AP:** Absence of organ failure and absence of local or systemic complications.

**Moderately severe AP:** Presence of transient organ failure, local complications, and/or exacerbation of co-morbid diseases.

**Severe AP**: Presence of persistent organ failure for more than 48 h. Organ failure will be defined as a score of 2 or more for one of the three systems (respiratory, cardiovascular, and renal) using the modified Marshall scoring system.

**Local complications** are classified as acute peripancreatic fluid collections, pseudocyst, acute pancreatic/peripancreatic) necrotic collection and walled-off necrosis.

**MODIFIED MARSHALL SCORING SYSTEM:**

Organ failure will be defined as a score of 2 or more for one of the three systems (respiratory, cardiovascular, and renal) using the modified Marshall scoring system. Organ failure scores will be calculated for all patients during the first 72 hrs of hospitalization based on the most extreme laboratory value or clinical measurement during each 24 hrs period. Duration of organ failure will be defined as transient (≤ 48 hrs) or persistent (>48 hrs) from the time of presentation. If organ failure affects more than one organ system, it is termed multiple organ failure (MOF).

**Criteria for organ failure based on Modified Marshall scoring system:**

| ORGAN SYSTEM | SCORE | | | | |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 |
| Respiratory (PaO2 / FiO2) | >400 | 301-400 | 201-300 | 101-200 | <101 |
| Renal (serum creatinine, mg/dl) | <1.4 | >1.4 to<1.8 | >1.9 to<3.6 | >3.6 to<4.9 | >4.9 |
| Cardiovascular (SBP, mm hg) | >90 | <90,fluid responsive | <90, fluid unresponsive | <90, ph<7.3 | <90, ph<7.2 |

**INCLUSION CRITERIA:**

Patients diagnosed as case of acute pancreatitis, admitted in emergency department of Dayanand Medical College & Hospital (DMC&H) and willing to participate in study after informed consent.

**EXCLUSION CRITERIA:**

Chronic pancreatitis

Acute on chronic pancreatitis

**OUTCOME**

To find cutoff value of The Bedside Index for Severity in Acute Pancreatitis (BISAP) score to predict Severity of Acute Pancreatitis.

**STATISTICAL ANALYSIS**

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups will be done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test will be performed and

exact test will be used when the expected frequency is less than 5. Sensitivity, specificity, positive and negative predictive values and accuracy of each method and its confidence interval (95% CI) were also determined, besides the Youden index (probability of correct classification) and determining the area under the ROC curve. A probability value (p value) less than 0.05 will be considered statistically significant. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

**7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.**

NO

**7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?**

YES

## LIST OF REFERENCES


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## PROFORMA

SR. NO. MRD NO.

NAME: AGE: SEX:

DATE OF ADMISSION:

DATE OF DISCHARGE / DOR /DAMA / DEATH:

ADDRESS:

OCCUPATION:

CHIEF COMPLAINTS:

HOPI:

PAST HISTORY:

PERSONAL HISTORY:

Signature of Candidate Signature of Supervisor

**EXAMINATION:**

**GENERAL:**

**CNS:**

**CVS:**

**PER ABDOMEN:**

**RADIOLOGICAL INVESTIGATION:**

**X-RAY:**

**USG ABDOMEN:**

**CT SCAN / MRI:**

**Signature of Candidate** **Signature of Supervisor**

| DATE | | | | |
|---|---|---|---|---|
| Blood Pressure (mm Hg) | | | | |
| Pulse Rate (/min) | | | | |
| Respiratory Rate (/min) | | | | |
| Temperature ($^0$F) | | | | |
| Glasgow coma scale score ( /15) | | | | |
| Hb (gm/dL) | | | | |
| TLC ( x $10^3$/uL) | | | | |
| DLC (P, L, M, E %) | | | | |
| Platelets (x $10^3$/uL) | | | | |
| S. Amylase (U/L) | | | | |
| S. Lipase (U/L) | | | | |
| Urea (mg/dL) | | | | |
| Creatinine (mg/dL) | | | | |
| pH | | | | |
| PaCO2 (mm Hg) | | | | |
| PaO2 (mm Hg) | | | | |
| FiO2 (mm Hg) | | | | |
| PaO2 / FiO2 | | | | |
| Modified Marshall Score | | | | |

**Signature of Candidate** **Signature of Supervisor**

**BISAP SCORE:**

**CAUSE OF ACUTE PANCREATITIS:**

**ORGAN FAILURE:** Transient (≤ 48 hrs) or persistent (>48 hrs)

**TYPE OF ACUTE PANCREATITIS:**

**DURATION OF HOSPITAL STAY:**

**SURGICAL INTERVENTION:**

**FINAL DIAGNOSIS:**

**OUTCOME:**

**Signature of Candidate** **Signature of Supervisor**

## INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

.....am willing to participate in the study **"A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

**Signature of Candidate**

**Signature of Supervisor**

# मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____

गवाह के हस्ताक्षर

नाम:

_____

रोगी के हस्ताक्षर/अंगूठे का निशान

नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

# ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

**"A PROSPECTIVE STUDY TO EVALUATE BISAP SCORE IN PREDICTING MORBIDITY AND MORTALITY IN ACUTE PANCREATITIS"** ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____
ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

_____
ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਮਿਤੀ_____

ਪਤਾ _____

ਪਤਾ _____

_____
ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ